THE

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DECEMBER, 1938

EDITORIAL.

Padi Experiments.

Following our usual custom, we devote the major portion of the December number of this Journal to a report on the progress in Malaya of the field investigations on padi. The Compiler of the account of this work during the padi season 1937—38, Mr. R. B. Jagoe, has drawn together the threads for his account from the 5 Padi Experiment Stations and 50 Padi Test Plots, distributed throughout Malaya.

The main problems appear to be concerned firstly, with water control; secondly, to give each area a variety of padi suited to local conditions, and thirdly, with manuring and cultivation.

With regard to water supply, Mr. Jagoe points out that water supply and water control are the first essentials, and until these are secured, padi cultivation is an uncertain and often unprofitable undertaking. The progress and value of the work of the Drainage and Irrigation Department has been commented upon in this Journal from time to time. Valuable results have been achieved by that Department in the opening up of new and extensive areas of land for padi cultivation. Equally successful, though perhaps less spectacular, has been the work of improving the water control of numerous small areas in different parts of the country. On a recent tour the present writer took the opportunity of inspecting a few such enterprises in areas which have been known to him for many years past, and was impressed by the vigour and general health of the crop which was nearing the flowering stage. Small areas form a not inconsiderable proportion of the total area under the crop, and while the task of improving irrigation under such conditions may be arduous, it is most certainly justified by results.

In the same way as irrigation of each small area is considered an individual problem, likewise the task of finding or adapting a variety of padi for each small area constitutes a separate problem. This explains the existence of the many small padi Test Stations throughout the country. The behaviour of a variety of padi varies considerably in different parts of the country. This variation is found in many characters of a variety of padi, but is most easily demonstrated by the difference in growing period. Mr. Jagoe points, for instance, to the fact that a type of padi may take a little over three months from planting to maturity in one part of the country and six months in another area.

The task of giving each area the best variety to suit local conditions has been steadily pursued by the Department of Agriculture for many years, and a considerable measure of success in this direction has been achieved. On such a problem, however, there can be no finality, and we confidently anticipate that the yield per acre by the employment of selected planting material will be still further increased as the investigations proceed.

Cultivation problems are also of a local nature, for methods used in one area are not necessarily applicable to another area. In this direction considerable progress has been made, and the cultivators induced, through practical demonstrations, to adopt methods which are an improvement on the time-honoured and more primitive methods.

Manurial experiments have been continued on the lines described in previous progress reports. The peculiar conditions under which padi grows render these investigations most difficult. Under certain conditions the yield of padi may be increased by manuring, but there still remains an unexplained "bar"— a point at which further applications of manure result in no increased crop. The sudden death of Mr. J. H. Dennett, who devoted much of his time to this problem, has held up the development of this work for the time being, but the field investigations have been continued, although so far, without a solution to the problem.

The importance of increasing the local production of rice has for many years been emphasized by the Department of Agriculture, and has been recently publicly discussed in several quarters. The lines of investigations pursued by the Department for the past 25 years have resulted in the accumulation of much valuable data of use in this connexion, and for those who wish to study the practical aspects of the problem of making Malaya more independent of imported rice we cannot do better than to advise them to give their consideration to reports, articles and special bulletins on this subject which we have published, and to the last annual report of the Drainage and Irrigation Department.

Original Article.

PADI SELECTION AND VARIETAL TRIALS 1937-38

Compiled by
R. B. Jagoe,
Botanist.

The following is a summary of varietal trials and selection work carried out by the Field Branch of the Department of Agriculture in twelve States and Settlements in the Malay Peninsula and in Borneo during the 1937-38 season.

The distribution of Experiment and Test Stations can be seen on the accompaning map, and is as follows:—

Perlis	...	2 Test Stations
Kedah	...	Telok Chengai Experiment Station and 6 Test Stations.
Penang	...	1 Test Station.
Province Wellesley	...	2 Test Stations.
Perak	...	Titi Serong and Talang Experiment Station and 10 Test Stations.
Selangor	...	5 Test Stations.
Negri Sembilan	...	3 Test Stations.
Malacca	...	Pulau Gadong Experiment Station and 2 Test Stations.
Pahang	...	8 Test Stations.
Johore	...	3 Test Stations.
Kelantan	...	Kota Bahru Experiment Station and 3 Test Stations.
Brunei	...	4 Test Stations, one of which is being developed as an Experiment Station for selection work.
Labuan	...	1 Test Station.

(A total of 5 Experiment Stations and 50 Test Stations).

As formerly,* standard Latin Squares were used (except where otherwise stated) and the minimum significant difference between yields of any two strains or varieties has been estimated on a basis of Fisher's "t" test for 95 per cent probability.

The season as a whole was not favourable for the rice crop, due, mainly, in the north of the Peninsula (Kedah, Province Wellesley, Perak (North), Kelantan) to drought between sowing and planting time, which prevented transplanting from taking place until the padi plants had been an exceptionally long time in the nursery beds, and in the south due to a variety of causes but most often to floods later in the season. These factors adversely affected the yields of the varietal trials at many of the Test Stations.

At several of the Test Stations, varietal trials have provided definite information as regards suitable varieties for particular conditions but the most valuable work of the season has been in selection of strains of local varieties and in examination of facts and factors with regard to methods of cultivation and most suitable dates of sowing.

* *Malayan Agricultural Journal*, Vol. XXV No. 12, 1937.

PERLIS.

Kampong Salang Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Season 1935-36.	Season 1936-37.	Season 1937-38.
Siam 29 ...	22.3	31.4	22.5
„ 76 ...	18.0	30.1	22.0
Nachin 10 ...	24.0	30.8	25.5
Radin China 4 ...	—	30.7	—
Mayang Ebus 88 ...	17.2	—	—
Reyong 20 ...	21.2	—	23.9
Radin Pulau ...	18.0	28.6	21.4
† S.D. ...	—	1.2	1.7
M.S.D. ...	—	1.8 lbs.	2.5 lbs.

There is no marked 'significance' amongst the selected strains over a period of three years.

Seriab Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Season 1935-36.	Season 1936-37.	Season 1937-38.
Siam 29 ...	29.0	23.7	27.3
„ 76 ...	23.7	—	27.3
Nachin 10 ...	24.5	21.3	—
Radin China 4 ...	—	19.9	—
Radin China 17 ...	—	—	30.7
Mayang Ebus 80 ...	—	—	30.1
Reyong 20 ...	16.2	—	—
Chubai 18 ...	—	20.8	—
To' Awang ...	24.7	23.5	26.4
S. D. ...	—	0.9	2.0
M. S. D. ...	—	1.3 lbs.	2.9 lbs.

† S.D. = Standard Deviation.
M.S.D. = Minimum Significant Difference.

PADI SEL
EXPERIM
MA
SIAM
PERLIS
LANGKAWI IS.
X KG. SALANG
X SERIAB
PG. PAUH X
X JITRA
X LANGGAR
O TELOK CHENGAI
X SALA KANAN
X
RANTAU PANJANG
X PULAI
KEDAH
PROV. WELLESLEY
PENANG
GENTING X
X BUKIT MERAH
SUNGAI ACHEH
TITI SERONG O
TG. PIANDANG X
KUALA KURAU
X BERIAH
X KG. KEDAH
X BAGAN SERAI
X SUNGAI KEPAR
X SELINSING
X BUKIT GANTANG
O TALANG
X BRUAS
PERAK
X SUNGAI MANIK
PANCHANG BEDENA
X S. HAJI DURANI
X TANJONG KARANG
SELANGOR
X KUANG
X KAJANG
X ULU KLAWANG
NEGRI SEMBILAN
X AMPANG TINGGI
X KENDONG
MALACCA
X ALOR GAJAH
PULAU GADONG O
JASIN X
X TANGKAK
X JEMEN
O KOTA BHARU
PASIR MAS
X BACHOK
X
PASIR PUTEH
KELANTAN
X KUALA LIPIS
X DONG
X PULAU TAWAR
PAHANG
KERDAU
X BAWAI
X MENGKARAK
100°
101°
102°
6°
5°
4°
3°
2°
1°
O - EXPERIMENT STATIONS
X - TEST STATIONS

ECTION AND
ENT STATIONS
LAYA (INCLUDING BRUNEI AND LABUAN)

The soil conditions at Seriab are considered not fully typical of the coastal heavy clays and a new site at Permatang Pauh has been arranged for next season.

KEDAH.

Telok Chengai Experiment Station.

Three varieties were under selection for their first year *viz*:— Mayang Tekai (from North Kedah), Serendah Sungei Dua (a popular Baling variety) and Raja Muda (a variety obtained from Siam). One hundred ear-to-row lines of the two former varieties, and fifty of the last, were planted out. After rejections had been made on vegetative characters and yield, the number of lines retained was 25, 24 and 19 respectively.

Jitra Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Season 1935-36.	Season 1936-37.	Season 1937-38.
Mayang Ebus 80 ...	38.2	29.1	18.8
„ 88 ...	35.0	—	—
Radin China 17 ...	35.1	30.9	18.3
Radin China 4 ...	34.8	—	—
Siam 76 ...	—	28.5	19.0
Reyong 6 ...	—	25.2 rat damage	21.3
S. D. ...	1.0	3.7	0.7
M. S. D. ...	1.8 lbs.	6.5 lbs.	1.2 lbs.

Salak Kanan Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Season 1935-36.	Season 1936-37.	Season 1937-38.
Mayang Ebus 80 ...	51.7	21.0	—
„ 88 ...	47.2	25.4	—
Radin China 4 ...	50.5	—	23.8
„ 17 ...	48.9	—	22.1
Siam 76 ...	—	25.7	—
Reyong 6 ...	—	21.8	—
„ 20 ...	—	—	20.7
Siam 29 ...	—	—	30.3
S. D. ...	3.5	2.0	2.3
M. S. D. ...	6.1 lbs.	3.5 lbs.	3.9 lbs.

Rantau Panjang Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Season 1935-36.	Season 1936-37.	Season 1937-38.
Mayang Ebus 80 ...	—	29.6	19.4
„ 88 ...	—	26.0	21.7
Siam 29 ...	32.6	30.0	16.4
„ 76 ...	32.5	—	—
Reyong 20 ...	32.7	—	—
Nachin 10 ...	34.6	30.0	17.2
Radin China 4 ...	35.3	27.4	15.0
S. D. ...	2.0	1.9	2.1
M. S. D. ...	2.8 lbs.	2.8 lbs.	3.1 lbs.

Pulai Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Season 1935-36.	Season 1936-37.	Season 1937-38.
Siam 29 ...	42.5	40.2	—
„ 76 ...	39.1	40.7	—
Reyong 20 ...	36.9	—	—
„ 6 ...	—	—	28.6
Nachin 10 ...	35.2	—	—
Serendah S. Dua ...	40.2	39.8	—
Radin China 17 ...	—	44.8	33.1
„ 4 ...	—	—	32.3
Mayang Ebus 80 ...	—	44.7	35.5
„ 88 ...	—	—	31.0
S.D. ...	2.7	3.8	2.4
M.S.D. ...	4.0 lbs.	5.5 lbs.	3.5 lbs.

Langkawi Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Season 1935-36.	Season 1936-37.	Season 1937-38.
Siam 29 ...	12.8	10.9	12.5
Nachin 10 ...	12.6	16.1	15.6
Puteh Melayau ...	9.6	—	—
Radin Siak 7 ...	9.4	—	—
Radin China 4 ...	—	10.5	10.6
Reyong 20 ...	—	7.4	12.5
S. D. ...	0.6	Rat damage	2.4
M. S. D. ...	1.0 lbs.		4.1 lbs.

The soil in Langkwai Island is very sandy and the average yields obtained from local varieties is about 1000 lbs. per acre, so that the above yields may be considered satisfactory. Nachin 10 appears to be better than other varieties which have been tried.

Langgar Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Siam 29 ...	18.9	Siam 29 ...	19.8
To' Seman 42 ...	16.5	To' Seman 35 ...	17.5
„ 88 ...	16.0	„ 103 ...	16.8
„ 5 ...	15.6	„ 12 ...	16.1
„ 7 ...	15.4	„ 100 ...	15.4
S.D. ...	1.0	—	1.2
M.S.D. ...	1.5 lbs.	—	1.8 lbs.

The season in Kedah was a poor one, and little exact information can be obtained from the results of varietal trials. The difficulties of the past two seasons are partly responsible for this, but they only stress the necessity for greater continuity, which has already been realised, in the design of future varietal trials.

PENANG.

Genting Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Mayang Kuning 48 ...	23.9	Seraup 371 ...	19.4
Mayang SaBatil 8 ...	22.5	Seraup 36 ...	19.2
M.S.B. Local ...	20.6	Mayang SaBatil ...	20.1
Siam 15 ...	21.1	Seraup 146 ...	17.6
„ 48 ...	17.3	Seraup 48 ...	17.8
S.D. ...	1.0	— ...	0.9
M.S.D. ...	1.4 lbs.	— ...	1.3 lbs.

It would appear that the local variety Mayang SaBatil is as suitable as any other variety for this area and it is possible that selections of this variety might be better than anything else.

PROVINCE WELLESLEY.

Bukit Merah Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Mayang Ebus 80 ...	12.6	Mayang Ebus 80 ...	13.4
Reyong 6 ...	12.1	„ 203 ...	12.6
Nachin 66 ...	9.8	Reyong 6 ...	11.4
Patoh ...	10.5	Siam 29 ...	12.6
Anak Didek ...	11.7	Milek Puteh 148 ...	10.5
Nachin 66 ...	11.2	Kunchor ...	12.1
Reyong 6 ...	11.1	Reyong 6 ...	11.4
Nachin 11 ...	10.8	Coimbatore 2 ...	11.5
Patoh ...	10.3	„ 5 ...	11.1
Anak Didek ...	10.2	„ 7 ...	10.7

No analyses were made on account of the uniform poorness of yields.

Sowing took place in July, but, on account of the drought, cultivation was irregular and transplanting was not possible until October, when seedlings had been 80 days in the nurseries; yields at Bukit Merah were therefore very poor and no analyses of the results have been made on this account.

The plot which is cultivated and in which vegetables were grown in the 1936 off season was planted with Mayang Ebus 80 and again gave notably better yields than any other section of the Test Station.

Local padi planters have very definite opinions about the different Mayang Ebus selections. Selections of this variety from Province Wellesley made at Titi Serong (*e.g.* M.E. 203,209) require plenty of water to give their best performance, while those from Kedah made at Telok Chengai (e.g. M.E. 80, 88) are generally more suitable for central Province Wellesley and in situations where the land is high and inclined to be dry.

Sungei Acheh Test Station.

Latin Squares of Seraup strains and Mayang Kuning 48 were laid down but considerable rat damage during October and November very seriously affected what showed promise of being a very fine crop. Of the undamaged portions of the seed multiplication plots there is little doubt that M.K. 48 was the best, as in the previous season.

PERAK.

Titi Serong Experiment Station.

Water supplies were insufficient during the nursery period and planting was delayed until early September. Conditions during the growing period were good, but showery weather at the beginning of February made drainage difficult to effect, and at harvest the padi fields were still under water.

Mayang Kuning 48 has done well, but its maturation period being somewhat longer than that of the Seraups makes it unlikely that it will ever be generally popular.

Selection Work.

There is again nothing to choose between the Machang selections, but this season Seraup 48 has beaten them in the Latin Square trial, so that they do not seem to be of great promise. Nevertheless, they have grain of good type.

As in lines in previous years Mayang SaBatil 8 has given the highest yield. Mayang SaBatil 4, 5, 6 and 9 do not appear, however, to be very much inferior.

Tongkat 2 is again the highest in yield with 7 and 10 not very far behind.

Further selection work is being carried out as follows:—

Machang. Nineteen lines, remaining from material obtained in Kuala Kurau two years ago, were grown and of these it has been recommended for selection that only lines 51, 52, 59, 61, 63, 64, 65, 66 and 74 be retained. These will be compared next season with Machang 2, the best of the first series of Machang selections.

Seraups. Seventy-six lines of Seraups, selected at Briah, Kuala Kurau, Titi Serong and Bagan Serai, were grown. Of these 23 lines with average yields of

Titi Serong Experiment Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Seraup 48 ...	18.1	Seraup 48 ...	17.8
„ 146 ...	19.1	Machang 2 ...	17.8
„ 371 ...	19.9	„ 5 ...	17.2
Mayang Kuning 48 ...	19.9	„ 10 ...	17.4
By inspection no significant differences.		By inspection no significant differences.	
Mayang Sa Batil 4 ...	19.3	Mayang SaBatil 7 ...	18.0
„ 5 ...	20.8	„ 8 ...	20.9
„ 6 ...	20.7	„ 9 ...	19.2
Seraup 48 ...	16.6	Seraup 48 ...	15.7
By inspection S. 48 significantly inferior to Mayang SaBatil.		S.D. 1.3 M.S.D. 2.3 lbs.	
Seraup 48 ...	15.5		
Tongkat 1 ...	17.7		
„ 2 ...	20.0		
„ 7 ...	19.9	S.D. 1.0 M.S.D. 1.5 lbs.	
„ 10 ...	19.3		

below 70 grammes per plant have been discarded. Lines Nos. 578 and 517 both yielded over an average of 100 grammes per plant, which is very good indeed for a poor season.

Seri Raja. Thirty-six lines, obtained after preliminary selection at Sungei Kapar and Selinsing during the previous season, were grown. Yields were not very high, but 20 lines which gave over an average of 70 grammes per plant have been retained.

Serendah. Thirteen lines from Bagan Serai were grown. The lines were very mixed in type but eight of them will be kept for next season.

Chantek Merah and C. Puteh. Twenty-one lines from Lenggong, *via* Talang, were grown at Titi Serong this season. They suffered from bird damage and all will be grown again next season.

The discarding has been rather drastic in several cases, but with the addition of a number of lines of Mayang SaBatil from Province Wellesley next season, both space and the time of the staff at Titi Serong will be very fully occupied.

Planting Distance Experiments.

It had been found that in the more fertile areas of Krian, Seraup 146 and Seraup 371 gave much better yields than Seraup 48, but that in other circumstances Seraup 48 was the better. It was thought that planting distances might have some influence on these differences in yields.

Experiments were therefore designed and consisted of Latin Square trials with replications of plots with different planting distances for each of the three varieties. These were laid down at Kuala Kurau, Titi Serong, Bagan Serai and Sungei Kepar Stations.

Planting distances employed and the number of hills required per 1/120 acre plot are as follows:—

12″ x 12″	15″ x 15″	18″ x 18″	21″ x 21″	24″ x 24″
363 hills	233	162	119	91 hills

Yields of grain and counts of tillers per hill have been recorded and analyses of results were made by calculating the yields per hill, yields per tiller and tillers per acre.

No evidence was found to show that there is any difference between the strains in the effect of planting distance on yields, but the experiment is being continued and will be more fully considered at the end of the 1938-39 season.

Kampong Kedah Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Seraup 48 ...	23.6	Seraup 48 ...	23.6
„ 146 ...	24.9	„ 146 ...	21.6
„ 371 ...	22.1	„ 371 ...	20.5
Mayang Kuning 48 ...	19.6	Radin 13 ...	15.5
		Radin 11 ...	12.7
S.D. ...	3.3	S.D. ...	2.1
M.S.D. ...	5.7 lbs.	M.S.D. ...	3.1 lbs.

Fairly good yields were obtained with Seraup strains, and results confirm the fact that Seraups (long term) are more suitable than Radin (medium term) varieties since the supply of irrigation water has been improved.

The purpose of this Test Station has been accomplished and it will be discontinued.

Kuala Kurau Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Season 1935-36	Season 1936-37	Season 1937-38
Seraup 48 ...	29.9	20.0 ...	17.0
„ 146 ...	37.0	30.8 ...	24.8
„ 371 ...	33.4	31.2 ...	24.6
Mayang Kuning 48 ...	(33.3)	24.7 ...	23.6
S.D. ...	2.1	2.1 ...	1.7
M.S.D. ...	2.6 lbs.	3.7 lbs. ...	3.0 lbs

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Mayang SaBatil 4 ...	27.2	Mayang SaBatil 7 ...	28.9
„ 5 ...	24.7	„ 8 ...	32.1
„ 6 ...	30.0	„ 9 ...	31.2
Seraup 48 ...	16.3	Seraup 48 ...	13.5

Bird damage occurred in several plots, and results are therefore not analysed, but it is obvious that Seraup 48 is significantly inferior to Mayang SaBatil, corroborating the Latin Square trials conducted at Titi Serong.

Results of the last three seasons indicate very clearly that Seraup 48 is significantly inferior in yielding ability to Seraups 146 and 371, as far as these trials are concerned, and additional evidence would seem to point to the fact that, although in the somewhat lighter or poorer soils, as at Kampong Kedah, Seraup 48 is the most satisfactory strain in joint consideration of its yields and straw characters, the substantially heavier yields of Seraups 146 and 371 in the deep and fertile soils along the coast, are likely to counter-balance any inferiority in straw strength, as far as this region is concerned.

Breeding work carried out in Kuala Lumpur by the Botanist during this season included crossings of Seraup 48 and Seraup 371 in an attempt to combine their good qualities.

Tanjong Piandang Test Station.

The Station will be opened next season in the extension of padi land towards the sea, along the coast road, and will combine padi trials and duck farming.

Bagan Serai Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Seraup 48 ...	13.6	Seraup 48 ...	15.9
„ 146 ...	15.2	„ 371 ...	17.6
„ 371 ...	15.2	Radin 4 ...	18.6
Mayang Kuning 48 ...	18.5	„ 7 ...	19.0
S.D. ...	1.8	S.D. ...	2.5
M.S.D. ...	3.1 lbs.	M.S.D. ...	4.3 lbs.

Seraup 48 ...	16.1
„ 146 ...	17.1
Radin 11 ...	17.6
„ 13 ...	17.8

By inspection no significant differences.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Season 1935-36	Season 1936-37	Season 1937-38
Seraups ...	16.3	12.2	16.2
Radins ...	17.6	14.4	18.2

Three years' results show a distinct bias in favour of Radin varieties, but yields are not very impressive and new local selections and introductions might be tried.

Briah Test Station.

The average yields per 1/120 acre in the 1936-37 season were 17.7 lbs. for Seraups and 18.3 lbs. for Radins, and this season Radin strains have again shown general superiority over Seraups. Yields of Siam 29 are variable and it is unpopular on account of its liability to lodge, which is especially manifest in Briah conditions, with hard soil, inclined to be peaty in varying degree.

Yields have never been very satisfactory except in the 1934-35 season which was a notably good one as regards the weather.

The area is not very good as regards control of water, and Mayang Ebus 80, a Kedah selection, might be worth a trial.

Briah Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Seraup 48 ...	14.1	Radin 4 ...	15.1
„ 146 ...	15.1	„ 7 ...	15.7
Radin 11 ...	17.4	„ 11 ...	15.5
„ 13 ...	16.1	„ 13 ...	16.2
Siam 29 ...	13.7	Siam 29 ...	12.3
S.D. ...	1.2	By inspection, Siam 29 significantly inferior to Radin strains.	
M.S.D. ...	1.8 lbs.		
Seraup 48 ...	11.8	By inspection no significant differences.	
„ 146 ...	10.9		
„ 371 ...	11.4		
Mayang Kuning 48...	12.0		

Selinsing Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Radin 4 ...	14.7	Seraup 48 ...	12.0
„ 7 ...	14.7	„ 146 ...	11.9
„ 9 ...	13.0	Radin 11 ...	12.3
„ 13 ...	13.4	„ 13 ...	12.9
Siam 29 ...	6.0	Siam 29 ...	8.0
By inspection, Siam 29 significantly inferior to Radin and Seraup varieties.			
Seraup 48 ...	11.5		
„ 146 ...	14.3	S.D. ... 1.1	
„ 371 ...	12.8	M.S.D. ... 1.9 lbs.	
Mayang Kuning 48 ...	13.7		

Padi crops have never been good on the, usually, rather hard sandy or stiff shale soils of the Selinsing-Semanggol area, nor has there been much difference between the yields obtained from the Seraup and Radin varieties which have been tried. An increase in the range of varieties for trial might be an advantage.

On a few occasions, cultivation trials have shown that substantial increases in yield of grain may be obtained as a result of digging the soil just before the padi season, and it is possible that an extension of the cultivation experiments, in place of the Latin Square varietal trials, might, at present, be a more valuable demonstration.

Sungei Kepar Test Station.

Yields from the varieties in the Latin Square trials are so low that they are of no value. An area of 300 acres near the 15th mile Taiping Road is very liable to suffer from flooding of the Sungai Kurau, where natural drainage in such circumstances may have been interfered with by the construction of the road. The Test Station is situated in the lowest-lying portion of this area and therefore is most susceptible to flood damage.

Apart from this the soil is fairly good, but, as it is not very typical of the predominantly hard soil of the Semanggol district, this is only another reason why a change of site may be advisable.

Bukit Gantang Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	Season 1935-36.	Season 1936-37.	Season 1937-38.
Siam 15 ...	15.9	25.5	28.4
„ 48 ...	24.6	25.4	27.1
„ 146 ...	24.5	32.3	32.3
Mayang Kuning 48 ...	—	31.8	32.9
S.D. ...	2.0	—	1.5
M.S.D. ...	3.3	—	2.6
Siam 29 ...	15.5	26.1	15.8
„ 76 ...	23.2	25.4	16.2
Radin 11 ...	21.5	23.1	23.9
„ 13 ...	21.2	23.6	23.0
S.D. ...	2.5	—	Rat damage
M.S.D. ...	4.3	—	—

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Machang 2 ...	30.6	Tongkat 2 ...	24.8
„ 5 ...	29.3	„ 10 ...	25.3
„ 10 ...	30.0	7 ...	26.3
Seraup 48 ...	28.3	Seraup 48 ...	24.9
S.D. ...	1.25	By inspection no significant differences.	
M.S.D. ...	2.2		

A summary of results of Latin Square trials of the past three years indicates the general superiority of Seraup strains over Siam and Radin strains.

Krian selections of Machang and Tongkat (other long term varieties) were tried in Latin Squares this season and show some promise, especially Machang 2.

Bruas Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Seraup 146 ...	16.0	Siam 29 ...	17.4
Seraup (local) ...	19.7	Pahit (Bota) ...	12.3
Pahit (Bruas) ...	17.7	Seri Bumi Puteh ...	11.4
Chantek ...	18.5	Radin Deli ...	11.5
Sakepol ...	20.0	Medan Petani ...	7.8
S.D.	1.9	Siam 29 significantly superior to other varieties.	
M.S.D.	2.8 lbs.		
Seraup 36 ...	20.1		
„ 146 ...	19.5	By inspection, no significant differences.	
„ 371 ...	18.4		
Siam 29 ...	19.9		

Much of the soil at Bruas has shown itself to be inimicable to the good growth of padi, but conditions seem to be improving. Radin varieties were not planted this year as they have been consistently poor.

Some of the local long term varieties tried in Latin Squares, with Seraup 146 as standard, would seem to be worth further consideration.

Talang Experiment Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Seraup 48 ...	19.4	Radin 11 ...	20.3
„ 146 ...	21.3	Siam 29 ...	22.9
„ 371 ...	22.4	Seraup 371 ...	21.5
Mayang Kuning 48 ...	18.4	Mayang Kuning 48...	23.1
Not analysed on account of rat damage.		S.D. 2.8 No significant differences.	

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Mayang Ebus 88 ...	26.4	Reyong 20 ...	27.8
„ 202 ...	26.8	Siam 29 ...	29.0
„ 203 ...	25.3	Radin 1 ...	26.2
„ 210 ...	24.3	„ 13 ...	24.2
By inspection, no significant differences.		S.D. 1.7 M.S.D. 3.0 lbs.	

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Mayang Ebus 10 ...	32.3	Mayang Ebus 10 ...	27.6
„ 11 ...	29.6	„ 11 ...	28.0
„ 13 ...	29.6	„ 30 ...	27.8
„ 203 ...	28.5	„ 203 ...	26.0
By inspection, no significant differences.		By inspection, no significant differences.	

For five years Mayang Ebus selections have consistently given very satisfactory yields, being much more consistent than any other variety, and the latest Mayang Ebus selections from Krian (Nos. 10, 11, 13 and 30) appeared also to be very good.

Local varieties in earlier stages of selection are Chantek Merah (7 lines), Chantek Puteh (14 lines), and Radin Che Mah (31 lines).

As in previous seasons Radin Che Mah did well, growth and tillering were good and there was absence of lodging. Chantek Merah and Chantek Putch, on the other hand, showed a tendency to lodge, were later in ripening, and appeared to prefer deeper soil and more water than was available at Talang.

The Siam 29 X Radin 2 hybrid selections H 1/3, 1/9, 1/11, 1/14 were grown in lines, and H 1/9, and H 1/3 were again slightly superior to the other two. It has been arranged to test these hybrids in Latin Square and field trials at several other Stations next season.

Sungei Manik Test Station.

The Test Station was commenced in 1935-36 in the Sungei Manik district in South Perak where an area of 30,000 acres is being developed with 24,000 acres as irrigated padi land.*

About 5,000 acres have been cultivated, but owing to the cover provided by the presence of jungle stumps and felled timber and the proximity of much newly opened land, rats are very numerous and Latin Square trials again suffered so much damage that tabulated yields are not worth recording. The two strains of Radin Merah, R.4 and R.7, with their strong tough straw, escaped with little or no damage and gave yields at 25.4 lbs. and 24.1 lbs. respectively, per 1/120 acre. Seraup 371 and Radin 13 were the next best in yields.

The land is fertile and some excellent crops have been obtained; but the control of water is not yet possible and drought, floods and rats still make it impossible to conduct varietal trials with reasonable reliability.

SELANGOR.

Kajang Test Station.

No varietal trials were laid down pending further examination of factors relating to season and water control.

Kuang Test Station.

No experiments were carried out at Kuang this season with the exception of the planting of several varieties in plots where the unsuitable nature of the soil was most evident during the 1936-37 season.

Small scattered areas of poorly developed padi plants were observed this past season, but the distribution cannot be correlated with that of the previous season, neither can any definite conclusion be drawn regarding varietal susceptibility.

Siam 29 gave crops averaging about 20 lbs. per 1/120 acre, and two local varieties, Banjar Rendah and Che Minah, gave reasonable returns.

* Annual Report of the Drainage and Irrigation Department, F.M.S. and S.S. 1937.

With the improved water supply and the more satisfactory crop obtained, it is considered that it may be worth while recommencing varietal trials next season.

Tanjong Karang Test Station.

This Station is situated in a strip of land which is suitable for padi cultivation, but lies between the coast and a large area of swamp jungle in Kuala Selangor just north of the Selangor River.

Panchang Bedena Test Station.

This Station has recently been opened in an area for padi cultivation not long cleared of virgin jungle in the north of Kuala Selangor. Yields are very variable and growth uneven due to adverse conditions, including rat damage. The irrigation and drainage scheme for this area has not yet been completed and as, with insufficient rainfall, water shortage persisted throughout the season, results of trials were not submitted.

In the previous season Siam 29, Reyong 20, Seraup 146 and Nachin 756 gave comparatively good yields and of these Siam 29 appeared to withstand best the lack of water during this past season.

Sungei Haji Durani Test Stations.

This Test Station is situated in the same district as Panchang Bedena but in lower-lying land, and conditions are not yet suitable for varietal trials, owing to danger from flooding.

NEGRI SEMBILAN.

Ulu Klawang Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Siam 29 ...	24.4	Radin 13 ...	18.8
Reyong 6 ...	23.5	Mayang Ebus 209 ...	21.0
Mayang Ebus 203 ...	15.6	„ 203 ...	17.3
Serendah Kuning ...	20.2	Serendah Kuning ...	22.7
S.D.	1.5	S.D.	2.0
M.S.D.	2.6 lbs.	M.S.D.	3.5 lbs.

In consideration of the fact that in the 1936-37 season sowing of padi at the Test Station was over a month later than usual and an appreciably better yield of grain was produced, the possibility was discussed of altering the sowing dates still further, to avoid damage to young seedlings by floods in May and the difficulties of harvesting during the wet weather of November-December, and a small trial was made this season.

The date of normal sowing this season was as in 1936-37, and again the results were good, being in fact the best obtained so far. Nevertheless, the still later sown padi (sown 1st June) in spite of being out of season, compared with surrounding

padi, and suffering pest damage, gave yields which so impressed the local headmen that it was subsequently agreed that sowing dates for the 1938-39 season should be decided upon on this basis.

Ampang Tinggi Test Station.

Sowing dates for all strains tested were unusually late (middle of August) and crops were damaged by floods so severely that yields of grain are not worth recording. It seems obvious from the records of the past three seasons that sowing dates should be, normally, about the first week in July, for a February harvest; and this is to be tried next season.

Kendong Test Station.

Another poor season and optimum dates for sowing remain to be determined. Slight adjustments have been made in sowing dates for next season, but it is possible that here, also, optimum dates may be about the first week in July for medium term varieties, which will mean somewhat later sowing than hitherto.

MALACCA.

Pulau Gadong Experiment Station.

This Experiment Station is situated in an area served by the Tanjong Minyak Irrigation Scheme, but a supplementary supply of water is required and this is obtained by pumping from the Sri Malaka River. It is hoped that it will be possible to increase the supply of pumped water for next year.

The main function of the Experimental Station, besides semi-mechanical and manurial experiments, is to serve as a Selection Station for padi-growing districts throughout the Southern portion of the Peninsula, and local varieties of padi, and varieties from Negri Sembilan and Pahang are now under selection there.

The eight remaining selections of local Serendah were tested in Latin Square trials this season with results as follows:—

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Serendah 14 ...	17.0	Serendah 135 ...	16.7
„ 27 ...	18.7	„ 141 ...	18.6
„ 111 ...	14.0	„ 144 ...	19.7
„ 122 ...	17.5	„ 149 ...	19.1
Serendah Unselected	11.8	Serendah Unselected	12.6
S.D. ...	1.4	S.D. ...	1.2
M.S.D. ...	2.0 lbs.	M.S.D. ...	1.8 lbs.

The ten selections of local Siam, remaining out of a collection made for examination of straw strength, all compared well with the original selection, Siam 29, which, though possessing excellent qualities otherwise, is somewhat deficient in this character.

Other varieties which were under selection are as follows:—

1st	year	ear-to-row	Milek Merah	Ex Pahang
	,,	,,	Anak Terus	,,
	,,	,,	Pilah	,,
	,,	,,	Jarum Mas	,,
	,,	,,	Gangsa Jeboh	,,
	,,	,,	Manchar Kasar	,,
	,,	,,	Gangsa Melor	,,
2nd	,,	,,	Sri Ayer A	,,
	,,	,,	Sri Ayer B	,,
	,,	,,	Milek Puteh	,,
	,,	,,	Terong Papan	,,
3rd	,,	,,	Serendah Puteh	Ex Negri Sembilan
	,,	,,	Serendah Kuning	,,
	,,	,,	Serendah Salleh	Ex Pahang
	,,	,,	Antar Bras	,,
	,,	,,	Gandar	,,
	,,	,,	Sri Menjadi	,,

Of the varieties under selection for the first year, only Milek Merah was of distinct promise, and of the second year varieties, Sri Ayer appeared to be the best. Maturation periods of all lines of Sri Ayer were 223 days, except for Sri Ayer B 4 which was 231 days from sowing to harvest.

Three lines of Terong Papan did fairly well. Yields were not outstanding, but it has an attractive grain and tillers well. Its maturation period in Malacca is approximately 240 days compared to about 200 days in Pahang.

Of the varieties in their third year of selection, five lines of Serendah Puteh, four lines of Serendah Kuning, three lines of Sri Menjadi and one line of Serendah Salleh have given yields up to Pulau Gadong standards and have been retained. Two lines of Antah Bras have been kept, though they are not very good, and all Gandar lines have been discarded.

Jasin and Alor Gajah Test Stations.

These are two new Test Stations in the Southern and Northern Districts, respectively, of Malacca, which this past season were planted up in large plots of several varieties, to obtain information concerning the fertility of the land.

PAHANG.

There are six main Padi Test Stations in Pahang, three inland and three near the coast. At four of these, varietal trials were laid down last season, but without

much success. The more immediate problems are to ascertain the relative maturation periods of different varieties of padi and to determine the most suitable seasons and methods for padi cultivation . Experiments have now been designed to examine these problems.

At present at Dong, Kuala Lipis and Sungei Blat Stations padi is sown about August, and at Kerdau, Pahang Tua and Bawang sowing takes place approximately in April. Yields vary greatly and are more usually fair to poor. Poor yields in some cases, may be due to unsuitable season, but in other cases, to the dependence for water supply on local rainfall and to the lack of water control.

The control of water, where this is feasible, is being dealt with by the Drainage and Irrigation Department.

Kuala Lipis Test Station.

This Test Station has a poor water supply, but has good drainage into the Lipis River, from which, however, it is very liable to suffer damage by flood water.

No analyses of results of varietal trials have been made on account of the very low standard of yields, but Siam 29, Reyong 20, Milek Kuning 3, Milek Puteh 148 and a local variety Ayer Mas appear to be worth more consideration than other varieties tried.

Dong Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Nachin 11 ...	21.0	Milek Puteh 148 ...	17.6
Milek Kuning 3 ...	19.7	„ 9 ...	12.8
Reyong 20 ...	11.3*	Siam 29 ...	16.2
Terong Papan ...	4.6*	Pekan Puteh ...	15.3
		Gangsa Tembiling ...	9.1*
* Damaged by too much water just after planting.			
Mayang Ebus 80 ...	19.0	Radin China 4 ...	21.0
„ 88 ...	19.9	Radin Siak 17 ...	20.0
„ 203 ...	18.3	„ „ 24 ...	20.6
Umut-Umut ...	8.0	Gangsa Ayer ...	17.6
Local variety obviously inferior.		By inspection, no significant differences.	

This Test Station is situated in the Dong River valley, most of which is supplied with irrigation water either by the Dong Irrigation Scheme or by small local streams. The area is broken up into small "petak" or plots with small degrees of terracing for purpose of water control. The Test Station is within the area supplied by the Irrigation Scheme. Drainage is also good and the soil a fairly fertile one, so that conditions here are very satisfactory, and it is believed that yields could be even better than those recorded above.

Kerdau Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Reyong 20 ...	24.0	Radin Siak 34 ...	10.2
Mayang Ebus 203 ...	8.5 *	„ „ 24 ...	9.8
Milek Puteh 7 ...	13.2	Serendah 875 ...	10.2
Siam 29 ...	22.7	Nachin 756 ...	11.7
* Planted out in April and damaged by excessive amount of water.		All planted out in June and most of it damaged then by too much water, also by birds at an early ripening.	
Siam 29 ...	18.3		
Nachin 66 ...	16.1	Very great variation in plot yields on account of damage by frequent minor floodings.	
Milek Kuning 3 ...	20.5		
Seri Ayer ...	16.3	By inspection, no significant differences.	
Radin 13 ...	15.9		

(All above figures are averages of yields from duplicate Latin Squares)

The levels of the land vary a great deal and frequent minor floodings cause considerable damage in the deeper parts, especially if the padi had not long been planted out from nurseries.

A long drain has now been dug, under the supervision of the Drainage and Irrigation Engineer, from the Test Station to the water gate, which may help to prevent floodings having such serious effect.

Normal sowing took place last season from 15th March to 4th April and, in general, the padi which was most successful was that sown at the end of March and planted out in May. Radin Siak (sown 5th May) and other short term varieties ripened before the rest of the padi and were damaged by birds.

A recent visit to this Test Station (October 1938) reveals the fact that, for season 1937-38, an unprecendented drought during September and early October is likely to be the cause of even poorer yields than the floods of last season. This exampli-

fies very clearly the difficulties appertaining to padi cultivation in the majority of these riverine *paya** lands with their dependence for supply of water on the irregular and uncertain rainfall of Pahang, and the lack of proper control of water.

Sungei Blat (Paya Besar) Test Station.

This Test Station is situated in an area of about 3,000 acres of land which has been swamp jungle, with drainage into the Sungei Blat. Drainage has been improved and irrigation water from the Sungei Pandan can now be supplied to 2,150 acres, of which 1,200 have been cleared. Padi cultivation has been commenced on about 500 acres of this.

Three Latin Squares were laid down, but yields are still poor and variable and are not worth recording.

Sowing took place from 8th August to 10th September and padi ripened and harvesting was carried out during March, during which month 17.88 inches of rainfall were recorded at the Station following an unusually dry season.

Average monthly rainfall figures for this Test Station are as follows:—

		Inches.			Inches.
January	...	12.80	July	...	3.00
February	...	7.80	August	...	3.70
March	...	12.40	September	...	6.00
April	...	6.30	October	...	10.20
May	...	5.60	November	...	9.00
June	...	5.00	December	...	11.50

These figures are probably fairly typical for the coastal districts, apart from the heavier rains which occur during November and December along parts of the coast itself. It is reasonable, then, to imagine that a more suitable season would be one which would allow padi to ripen between May and August, provided that the risk of damage to young seedlings by floods in December or January can be overcome.

The possibilities of wet nurseries and two or three transplantings, as practised in Krian, might be worth trial here.

Bawang Test Plot.

Observation plots only were planted here, pending examination of the problem of most suitable sowing date. Siam 29, Siam 76 and Radin 2 sown at the end of April and harvested early in December, and Milek Kuning 3 sown in deeper land at the end of March and harvested in the middle of January, gave reasonably good returns of between 350 to 400 gantangs per acre.

This Test Station has an assured supply of water and good drainage. The land is also very level and has been found suitable for manurial experiments requiring well controlled conditions, but it is not typical of the riverine *paya-paya*† amongst which it is situated.

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* *paya* = marsh (see fuller description in summary.)

† *paya-paya* = plural of *paya*.

Pahang Tua Test Plot.

This Test Station is situated in an area which prior to the extraordinary floods of December 1926 was well cultivated and used for *tenggala** padi. The soil is very good but somewhat high lying and therefore without a natural supply of water for irrigation or inundation. Nevertheless, the land was ploughed, seed was broadcast and good yields were obtained at the end of a normal rainy season.

Cultivation of this area has recommenced. Experiments were conducted last season, but lack of rainfall between March and June interfered with sowing and transplanting so that results are valueless. A pump is being installed by the Drainage and Irrigation Department to lift water from the Sungei Pahang Tua, and when this is working it is possible that an August-April season will be better than the present May-January season, although there is the possible danger of floods in October damaging young seedlings. As the land, however, is comparatively high it should not, normally, be liable to serious damage by floods.

Pulau Tawar Test Station.

This Test Station was first opened in the 1936-37 season in the new inundation area of Padang Kangsar on the Pahang River a few miles below Jerantut, but difficulty has been found in retaining water on the land in this area and the Test Station has not yet had a chance of functioning.

Mengkarak Test Station.

A new Test Station has been established in the Temerloh District and is to be opened for varietal trials next season.

JOHORE.

Tenglu Test Station.

Critical experimentation has been discontinued until the problem of water control, and drainage in particular, has been fully examined by the Drainage and Irrigation Department.

Jementah Test Station.

Five Latin Square varietal trials were planted, but abnormal floods occurred in November, followed by destruction by wild pigs and rats so that yields were very disappointing. Reyong 6 (sown June) and Serendah Kuning (sown May) are the varieties which suffered least damage. Observation plots, which were planted in addition, gave somewhat better yields, the best being obtained from Reyong 6, Reyong 20, Serendah Kuning and Radin China 17 with 350 to 400 gantangs per acre. Harvesting took place at the end of January.

Tangkak Test Station.

It is noteworthy that, without exception, the best yields in the Latin Square trials were obtained by varieties which ripened towards the end of February. This

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* *tenggala* = a plough.
Sungei = river.

does not hold good to quite the same extent in the observation plots, but of 7 varieties giving over 500 gantangs per acre, 5 were harvested between the 17th and 26th of February.

This Test Station is only about 20 miles distant from Jementah and it is of particular interest to note the considerable differences in dates of sowing, which are during July-August at Tangkak, but in May-June at Jementah, and in maturation periods, which are three to six weeks longer at Jementah.

Tangkak Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Reyong 20 ...	20.5	Ser. Kuning ...	19.2
Siam 29 ...	15.5	Radin China 17 ...	22.3
Nachin 66 ...	13.4	„ 4 ...	13.3
„ 11 ...	8.2	Radin 2 ...	10.1
Siam 76 ...	8.0	Lembut Tembiling ...	6.4
S.D. ...	4.5	S.D. ...	5.8
M.S.D. ...	6.6 lbs.	M.S.D. ...	8.5 lbs.
Siam 29 ...	16.8	Reyong 20 ...	26.6
Serendah Kuning ...	15.2	Radin Siak 34 ...	13.6
Mayang Ebus 203 ...	10.4	„ „ 24 ...	8.5
Siam 76 ...	9.6	„ „ 17 ...	8.8
By inspection Siam 29 and Serendah Kuning significantly better than the other two strains.		By inspection Reyong 20 significantly better than Radin Siak.	

Yields have been much better at Tangkak, indicating the possibility that August to February may be the best season, but no real comparison can be made until water control facilities, which are now receiving attention, have been improved at Jementah.

It is noteworthy that the highest average yields have been maintained by Seraup strains, and other selected strains of Seraup types are, therefore, being introduced.

Siam 29 has also given good yields except that last season it gave a poor crop in the Latin Square although a good one in the field.

KELANTAN.

Kota Bahru Experiment Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	1935-36	1936-37	1937-38
Siam 29 ...	22.7	25.5	15.2
Siam 76 ...	17.2	22.7	14.3
Nachin 27 ...	13.7	17.2	16.9
Nachin 66 ...	15.9	24.0	19.5
Radin 2 ...	11.8	14.7	16.8
Radin 13 ...	19.7	16.6	15.9
S.D. ...	3.2	1.5	2.5
M.S.D. ...	4.1	1.9	3.2
Seraup 15 ...	26.5	25.5	21.8
„ 36 ...	27.5	24.3	23.6
„ 48 ...	22.4	23.6	19.8
Radin 2 ...	19.2	19.0	16.3
„ 4 ...	25.3	22.1	20.6
Mayang Ebus 203 ...	22.5	17.5	17.2
S.D. ...	1.9	1.7	2.0
M.S.D. ...	2.5	2.2	2.6
Radin Siak 7 ...	20.5	18.9	21.0
„ „ 17 ...	19.4	17.1	20.3
„ „ 18 ...	19.3	16.0	18.4
„ „ 24 ...	19.6	22.1	20.2
S.D.	(No significant difference)	1.3	2.2 lbs.
M.S.D.		2.2 lbs.	1.2

Variety.		Mean Yield per 1/120th acre in lbs.	
Padang Trengganu 5	...	15.9	
„ „ 9	...	17.0	P.T. 22 is the best strain, but P.T. 5, 9 & 11 suffered from considerable rat damage.
„ „ 11	...	16.8	
„ „ 22	...	20.9	
Padang Trengganu, unselected.	...	17.1	

It is of interest to note that Radin Siak strains give comparatively high yields for they are, in Kelantan, medium rather than short term padi and approximate to Seraups in their maturation periods under Kelantan conditions.

Radin Siak 7 and 24 appear to be slightly better than Radin Siak 17 and 18.

Selection Work.

The following varieties of wet padi were under selection, by ear-to-row method:—

Variety.	No. of lines.	Selection commenced.	Maturation period in days.
Padang Trengganu ...	6	1934-35	225
Morak Sepilai ...	7	1935-36	225
Mayang Sagumpal ...	16	„	225
Singgora ...	11	„	200
Anak Naga ...	16	„	204
Bintang Berayon ...	23	„	207
Nalong ...	50	1937-38	225
Manek Siam ...	50	„	230

Of these only Padang Trengganu has reached the stage for trial in Latin Squares and P.T. 22 is appearing to be somewhat superior to other selections.

It has been decided to discard the variety Bintang Berayon altogether, as a varietal survey has shown it to be of little importance, nor is it a type worthy of much attention.

No very promising lines have been discovered in Anak Naga, Singgora, Mayang Sagumpal or Morak Sepilai and it is probable that re-selection on a wider basis will be necessary.

Some excellent results were obtained in lines of Nalong and Manek Siam, both important varieties in Kelantan and adaptable to various conditions. It is unfortunate that their grains are somewhat small and not particularly well adapted for milling.

Dry Padi Trials and Selection.

Dry padi cultivation or *padi tugalan** is much more important in Kelantan than elsewhere in Malaya, and extensive areas are planted in this way in the Kota Bahru District and smaller areas in the Pasir Mas and Bachok Districts.

Seven varieties of dry padi have been included in trials at Kota Bahru and at Bachok, and some selection work has been in progress on five of them, but results have been disappointing so far.

* *tugal* = a pointed stick (for making holes into which a few padi seeds are dropped).

Pasir Puteh Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.		
	1935-36	1936-37	1937-38
Siam 29 ...	19.5	14.2	20.4
Nachin 66 ...	20.2	13.9	18.8
Serendah 824 ...	19.8	12.1	17.4
Nachin 756 ...	13.6	12.0	13.1 Rat damage
S.D. ...	1.25	Rat damage	1.8
M.S.D. ...	2.2 lbs.		3.1 lbs.
Siam 29 ...	17.2	9.8	15.9
Siam 76 ...	18.1	10.0	14.3
Radin 4 ...	18.1	10.6	15.1
Radin 13 ...	18.9	9.8	15.8
S.D. ...	1.1	Rat damage	By inspection, no significant differences.
M.S.D. ...	1.9 lbs.		
Siam 29 ...	16.5	9.4	15.4
Padang Trengganu	19.8	15.8	19.1
Nalong ...	20.5	16.4	18.8
Manek Siam ...	21.2	16.4	19.4
Serendah ...	19.2	14.6	15.1
S.D. ...	1.4	Rat damage	1.9
M.S.D. ...	2.1 lbs.		2.8 lbs.
Siam 29 ...	15.2	6.8	13.5
Anak Naga ...	12.4	9.9	16.9
Anak Ulat ...	18.3	12.5	15.7
Chantek ...	18.6	14.0	15.8
Radin 4 ...	—	—	18.1
S.D. ...	2.8	Rat damage	2.0
M.S.D. ...	4.1 lbs.		2.9 lbs.

The soil at Pasir Puteh is light and sandy and yields are not very high. Siam 29 continues to do fairly well but a summary of yields for the past three seasons indicates that there are several local varieties which are probably capable of doing better than introduced selections.

Bachok Test Station.

The soil at Bachok is very sandy and scarcely suited to either wet or dry padi cultivation, especially as cultivation is entirely dependent on rainfall. Yields during the past two seasons have been too low to be worth recording. Work at this Station is now confined to manurial experiments.

Pasir Mas Test Station.

This Station was opened this season. The soil is a clay-loam, slightly heavier than that of the Kota Bharu Station, but, as at Bachok, water supply depends entirely on local rainfall. Yields were poor, due mainly to a late start, and are not recorded.

BRUNEI AND LABUAN.

Kilanas Test Station.

Yields of padi in varietal trials were very poor, the poorest obtained since the Station was opened in 1933-34 season, but yields from observation plots were the highest yet harvested and indicate that Seraup strains are eminently suitable for the locality. Part of the site of this Test Station has proved to be quite unsuitable for experiment work; this will soon be altered and more reliable varietal trials will then be possible.

Selection work is being carried on in Brunei at Kilanas, and this Station is assuming the importance of an Experiment Station.

Varieties under selection are Jongkok, Radin Pasir, Arat, Limbu, Langsat Puteh and Langsat Kuning. Progress has been as follows:—

Jongkok	...	51	lines	were	reduced	to	43	this	season
Radin Pasir	...	41	,,	,,	,,	,,	31	,,	,,
Arat	...	20	,,	,,	,,	,,	11	,,	,,
Limbu	...	30	,,	,,	,,	,,	23	,,	,,
Langsat Puteh	...	25	,,	,,	,,	,,	12	,,	,,
Langsat Kuning	...	26	,,	,,	,,	,,	17	,,	,,

In addition, preliminary selection was continued on a further 500 plants of Longkok, and on 500 plants of each of the varieties Langsat and Anusan, from which 30 plants of each were retained for ear-to-row lines the next season.

A survey of all varieties of padi in Brunei is being made.

At Lumapas 500 additional single plants of each of the local varieties Arat and Langsat Kuning were grown and selections have been made from these.

Lumapas Test Station.

Variety.	Mean Yield per 1/120th acre in lbs.	Variety.	Mean Yield per 1/120th acre in lbs.
Seraup 36 ...	22.1	Seraup 15 ...	12.7
„ 146 ...	26.0	„ 48 ...	19.6
„ 371 ...	22.9	Mayang Kuning 48	28.3
Jongkok ...	10.0	Jongkok ...	15.0

Analyses are not made on account of the severity of rat damage in some of the plots.

Variety.	Mean Yield per 1/120th acre in lbs.	
Siam 29 ...	6.6	
Radin 13 ...	13.5	Damage by pests was very severe in this Latin Square.
Milek Kuning 3 ...	12.6	
Jongkok ...	16.2	

Varietal trials confirmed previous indications that Krian long term selections are the heaviest yielders in this district. Mayang Kuning 48 was included in the trials this season and gave yields of 3,400 lbs. per acre, with Seraup 146 next best with 3,100 lbs. per acre. Seraup 15, Milek Kuning 3 and Siam 29 gave very good yields in seed multiplication plots, but, owing to pest damage, yields were not up to the standards of the 1936-37 season, when four Seraup and Jonkok plots gave over 6000 lbs. per acre in this very fertile soil.

Kuala Abang Test Station.

Lack of water control at Kuala Abang militates against high yields at present. Normally there is shortage of water, but the site is liable to deep flooding. The soil is a good deep clay and if water control can be secured, high yields should be obtainable.

The varieties in the Latin Square trials suffered considerable damage this season by floods, stem borers, birds and rats, and results are therefore not tabulated. The varieties that gave best yields in Latin Square and in observation plots are Siam 29, Milek Kuning 3, Milek Puteh 148 and the local varieties Jongkok and Langsat.

Berakas Test Station.

It is hoped to encourage wet padi cultivation in place of dry padi and preliminary trials were conducted, but the unsuitable nature of the soil and the difficulties of the situation make it probable that a better site in a more suitable area will have to be selected for this Station.

Bukit Kallam Test Station. (Labuan).

Selection work with local varieties continues; of the original selections 25 lines of Siam, 16 of Acheh and 8 of Pasir were planted this season for continued observation, and were reduced to 13, 12 and 7 lines, respectively, for next season.

Second series selection was continued with 44 lines of Rangoon, 22 lines of Siam, 16 of Acheh and 20 of Piasau and a third series was commenced with 500 plants of each of Siam, Rangoon and Piasau.

Sowing took place in August and September and seed multiplication plots of Seraup 15, Siam 29 and Milek Puteh 148 were grown.

MATURATION PERIODS OF PADI.

Considerable differences in maturation periods of many varieties of padi have been noted, and the following table gives a very rough indication of the variation that occurs throughout the Peninsula and Brunei.

	Maturation period in days.			
	Kedah-Kelantan	Brunei	Perak	Southern Areas
Seraup types ...	200	200	240	280
Radin Siak ...	190	185	165	180
Radin, Siam and Nachin types ...	180	190	190	220

The degree of efficiency of water control greatly affects the length of maturation periods of padi, and sowing dates may also be of significant account, but it would seem that the degree of latitude, small though the difference may really be, may have a greater influence than either.

Factors affecting correlated trials are being examined and a series of observation plots are to be laid down in the 1939-40 season in an endeavour to obtain more precise information on the effect of latitude on maturation periods, and possibly yields.

SUMMARY.

Kedah.

The season has been a particularly poor one. The drought which commenced just before planting time was most severely felt in Kedah, and there was, again, some damage from disease, though not to the same extent as last season.

Varietal trials have not provided very much new information and it was decided that more continuity in the Latin Square comparisons is desirable.

Penang and Province Wellesley.

The local variety, Mayang SaBatil, appears to be very suitable for Penang. Selection is being undertaken at Titi Serong Experiment Station in Krian and selected strains,when available, should do well.

In Province Wellesley North the selected strain, Mayang Ebus 80, from Kedah, is gaining in popularity.

In Province Wellesley South, the padi growing area is a natural part of old Krian and conditions are very similar to those of the adjoining north-west portion of that District. The Krian Irrigation Scheme was extended to include this area a year or two ago, but the water supply is, as yet, not sufficient for the whole of it.

Perak, Krian District.

The north-west coastal districts have a deep and fertile soil and are eminently suitable for Seraup and other long term varieties of padi. Seraup 371 and 146 have proved themselves the highest yielding Seraup strains, but Mayang SaBatil selections, now being tried, are also doing very well.

The south-east districts of Krian, with firmer, poorer soil, are very different, and medium term Radin varieties have usually done slightly better than Seraups, but yields have never been very high.

Seraup 48 has maintained a degree of popularity, especially in the intermediate central areas, on account of straw strength and good milling grain.

Perak (general).

The padi growing areas at Bukit Gantang and Bruas are both on granite soil and at both of the Test Stations, Seraup types have done best, although in the older established land, at Bukit Gantang, yields have been higher.

Talang Experiment Station and the majority of the padi lands around Kuala Kangsar are on high-built alluvium over-lying quartzite. The most consistent high yields at Talang have been obtained with Mayang Ebus selections, although good yields were also obtained with Seraups in the 1936-37 season, and with Siam 29, Reyong 20 and Radins on other occasions.

At Sungei Manik, in low-lying alluvium and with good supply of water, good yields should be obtained with Seraup types when the padi land is adequately developed.

Selangor.

Water control is the chief problem, and precise experiments must await the completion of the drainage and irrigation schemes now being carried out by the Drainage and Irrigation Department.

Pahang.

There are two distinct conditions under which padi cultivation is carried on in Pahang. These are the terraced river valley areas as at Dong and Budu, and the stretches of flat land as at Sungei Blat and Pahang Tua, all of which are or can be

irrigated and are easily drained. Then there are the *paya-paya** or swamps which have no assured water supply and, in very many cases, have little or no natural drainage.

Although individually these swamps are small, in the aggregate they form a very considerable proportion of the padi land of Pahang. The majority of them are situated along the banks of the Pahang River from Jerantut to its mouth at Pekan. These riverine swamps are saucer-shaped or dish-shaped in general principle, and varying areas of each are successfully cultivated according to the amount of water present and the varying depths of it throughout the season.

These riverine *paya-paya* have been formed in two ways, either by the daming up of the outlets of small irregular seasonal tributaries, by sand and silt at their mouths, or by the formation of dead water bends as the meandering river gradually changes its course. In most cases, drainage difficulties could be overcome, but these small swamps have very insufficient or no catchment area of hills behind them to provide a regular supply of water, and are too small individually for any expensive scheme for supply of water, as by pumping.

In addition to this, rainfall in Pahang is both more irregular in season and less evenly distributed than is usual on the western side of the Peninsula, and when rain does come it often is very heavy and causes damage by flooding.

Problems of water control are being examined by the Drainage and Irrigation Department.

In the areas with irrigation water, co-ordinated experiments, to determine the most suitable seasons and sowing dates, have been designed for next season.

The question of type of nursery is also receiving attention, but it seems likely that the present normal dry nursery is best suited to most padi areas in Pahang, except possibly at Sungei Blat, where conditions approximate more closely to those of Krian, where wet nurseries are most effective.

Negri Sembilan.

Progress was made in endeavours to ascertain the most suitable dates for sowing.

Malacca.

The position remains unchanged as regards Siam 29 being the most commonly grown strain of padi, but demands for seed of Milek Puteh 9 make it likely that this strain will supercede Nachin 11 for second place in popularity. At Pulau Gadong Experiment Station selection work on varieties of padi from Negri Sembilan and Pahang was continued. The season has been a good one.

Kelantan.

Seraup strains continue to give the highest yields at Kota Bahru, and selection work on promising local varieties is progressing.

Weather conditions were not favourable but this was partially countered by the scheduling of dates for the successive planting operations in each District, which resulted in more regularity in growth and maturation of the crops.

* *paya-paya* = plural of *paya*.

Johore.

The best yields were obtained at Tangkak Test Station, where sowing took place during July and August, and where water supply was satisfactory. Reyong 20 was the best strain in the Latin Square trials and Reyong 6 in the observation plots. Lack of adequate water control (drainage in particular) in several parts of Johore is causing a reduction in the area under cultivation.

Brunei.

Padi cultivation in Brunei is at present dependent on local rainfall, but the soil appears to be very fertile and high yields are expected from Seraup strains when conditions of padi cultivation become better established.

Received for publication 3rd November, 1938.

Abstract.

RICE: FOOD CROP OF TROPICAL AND SUB-TROPICAL LANDS*

Rice (*Oryza sativa*) is the dominant food crop of the plains in the monsoon areas of the tropical and sub-tropical parts of South-eastern Asia, even as wheat is of the temperate lands. Countries enjoying the Mediterranean type of climate, like Italy and Spain, also grow rice. The crop is raised in California, in the United States, in Brazil, in Egypt, and in a number of tropical African territories. In British India, China, Indo-China, Burma, Java-Madura, Japan, Siam, the Philippine Islands, and Korea large areas are under the paddy crop. According to the International Year Book of Agricultural Statistics the area under rice crop throughout the world (excluding China) was 59,100,000 hectares (one hectare = 2.47 acres) in the 1937-38 season. It is instructive to compare this figure with the area under wheat, which amounted to 106,750,000 hectares (excluding Russia) in 1937.

Cultivation.

Rice cultivation demands a high temperature and abundant moisture. The crop has to be grown in fields capable of being flooded at certain stages of its growth; hence areas under rice are distributed along the great river deltas, low-lying seaboard tracts subject to inundation during the summer rains, or in regions commanded by irrigation works. Rice culture entails enormous labour, for the most part in swampy and unhealthy conditions. The seeds are first sown in a carefully tilled and heavily manured seed-bed or nursery. Fields on which rice is to be grown are embanked to retain water as long as may be needed, and the ground is often laboriously levelled for this purpose. Their surface is puddled into a thin mud and green manured.

In four or five weeks after the sowing the seedlings attain a height of eight to ten inches and present a pleasing picture of emerald green under the clear azure blue tropical skies. By then they are ready for removal into the field. The transplantation is effected by hand, often by women, each separate seedling being forced into the soft mud. Were this not done the weeds are apt to get the upper hand and smother the rice crop. When the seedlings are in an early stage of growth two inches of water are ample, but when the stem is strong even high floods are unable to drown the plant.

Under favourable conditions, with forcing sunshine and abundant water supply, the plant grows astonishingly rapidly; the stalk putting on nine inches in height within twenty-four hours is not uncommon.

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* Abstract of an article under the same title, published in *The Manchester Guardian Commercial* of October 21, 1938. *The Manchester Guardian Commercial* has also published the following special article on crops on the dates named :— Maize Sept. 30, Jute July 22, Hemp July 8, Flax June 17, Cotton May 27, Copra May 20, Coffee May 6, Cocoa April 29.

Rice culture calls for heavy manual labour and the aid of cattle for ploughing, treading, and later the transport of paddy from the growing centres to market towns.

A larger share of work falls on the Chinese peasant than on the Indian cultivator, as China is short of cattle. The same factor explains the annual seasonal migration of hundreds of thousands of Indian agricultural labourers to the sparsely populated Burma for sowing and reaping the rice crop of that country.

Here is a fundamental distinction between rice and wheat culture. If wheat, at any rate that part of it which enters international trade, is par excellence the crop of the sparsely populated, relatively prosperous, temperate regions of the globe, and the industry is highly mechanised, rice is the grain crop of the densely peopled tropical and sub-tropical regions, raised almost wholly by manual labour. Moreover, rice is the only food-crop capable of growing in swampy tracts, where no other equally useful cereal would thrive.

The so-called hill rice is sown broadcast on ordinary arable land and is not irrigated. It is often grown in tropical countries in regions as high as 8,000 feet above sea-level, and, little plain land being available under such conditions, terrace cultivation is often resorted to. The yield per acre of hill rice is much less than the crop grown under irrigation.

Curiously enough the best yields of rice come from warm temperate lands, Spain registering 62.8 quintals per hectare, Italy 51.2, and Japan 38.6. The corresponding figures for China, British India, Burma, and Siam amount respectively to 26.5, 13.9, 13.3, and 16.1 quintals per hectare. It is very probable that such striking variations in crop yields are the outcome of the climatic conditions rather than due to the different strains growing in different areas.

Research work in the laboratories and field stations is being done in every leading rice-growing country to evolve disease-resisting and better-yielding strains, on the use of better implements and the application of fertilisers where soil conditions demand it.

One-half of the world acreage under the rice crop is found in India and China. India has the largest acreage under rice, and China is the largest producer of the crop in the world, as the figures of area and yield bring out in the table below.

Preparation and Marketing.

The preparation and marketing of rice is best illustrated by taking the case of Burma, the largest exporter of rice in the world. The paddy market for the new crops opens about the middle of December, and the marketable surplus is largely disposed of by the actual growers within the next four months or so. Landowners who always collect rents and frequently debts from their tenants in kind, traders and speculators, store considerable quantities of paddy till later on in the year in the hope of a rise in prices. Paddy is sold by the hundred baskets; the standard Government basket has a capacity of nine gallons and holds 46lb. It is generally carted loose for storage, supply to the local mills, and transhipment by boat. Bagging is done at the collecting points on the railway line.

The milling of paddy to produce white rice is done by large mills and consists of three main operations, cleaning, husking, and pearling. Extraneous matter and unfilled and small grains are first removed by cleaning. Shelling consists in removing the husk from the kernel, and the products coming out of the huller include shelled rice, containing a small proportion of unhusked rice, broken grain, and some bran and dust. The unhusked rice is separated from the husked rice by a shaker and sent back to the huller. Pearling cone, to rub off the pericarp or outer covering to yield white rice, constitutes the third process, yielding white rice, bran, and rice meal.

Western markets demand a more brightly polished and attractive rice than is produced from the pearling cones. The white rice is further polished, glazed with talc and glucose, and slightly oiled to give it a pleasing translucent appearance. Countries like South India, Ceylon, and certain African territories importing rice in bulk favour the parboiled variety. Here the paddy is steamed (before the skin is removed) and dried in the sun. Parboiling fixes the vitamin of the cuticle in the rice berry, and parboiled rice is thus more nutritious than polished rice.

Formerly England had a fairly important rice-milling industry, but Continental and Asiatic millers have captured the rice-milling trade by reason of their lower operating costs.

All parts of the rice plant are useful. Even the husk forms valuable, though bulky, fuel for the mills. Brown rice is materially richer in fat and protein, besides having a larger content of vitamin B (Oryzanin) than the polished variety. The market however, demands polished rice for its appearance, even as it demands white flour. A diet limited to polished rice renders Eastern races liable to the well-known deficiency disease, beri-beri, which is avoided by mixing some pulse with it.

Rice bran makes excellent cattle food and is much in request for the manufacture of special feeding cakes. Broken rice is used for brewing and distilling. 'Saki,'' the national beverage of Japan, is prepared from rice. It is also used for the preparation of starch and rice flour. Coarse mats, sandals, thatches and packing materials are made out of rice straw and its use as a fodder for cattle is not to be despised.

Rice ranks, after wheat and maize, as the third most important food grain in international commerce. Trade in rice totalled 6,400,000 tons in 1914, including a substantial volume of re-export trade. In recent years it has been well over 7,500,000 tons, including small amounts of paddy not converted to terms of clean rice. If the Western European countries are the leading importers of wheat, Asiatic countries growing rice insufficient to feed their local populations are the chief importers of rice.

The Leading Exporters.

Burma, Indo-China, Siam, Korea, and Formosa are the leading exporters of rice. Burma's average annual rice exports amount to some 3,000,000 tons, half of which are taken by India. Prior to April, 1937, when Burma formed part of India,

World Rice Production

	Area in 1,000 hectares.			Production in 1,000 quintals.			Yield in quintals per hectare.*		
	1927-8 to 1931-2.	1936-7	1937-8.	1927-8 to 1931-2.	1936-7	1937-8.	1927-8 to 1931-2.	1936-7	1937-8.
British India ...	28,014	29,347	29,134	404,600	425,397	404,954	14.4	14.5	13.9
China† ...	17,130‡	18,149	—	430,792‡	480,149	—	25.1‡	26.5	—
Indo-China ...	5,441	5,463	—	59,482	63,162	—	—	11.2	—
Burma ...	5,136	5,113	5,205	73,567	71,956	69,374	14.3	14.1	13.3
Java-Madura ...	3,542	3,864	—	53,213	57,719	—	15.0	14.9	—
Japan ...	3,186	3,180	3,190	112,863	124,981	123,087	35.4	39.3	38.6
Siam ...	2,575	2,226	2,912	42,432	33,799	46,956	16.5	15.2	16.1
Philippines ...	1,790	—	—	21,845	22,453	19,800	12.2	—	—
Korea ...	1,604	1,588	1,625	29,534	35,948	48,887	18.4	22.6	30.1
Formosa ...	597	682	658	12,809	17,740	17,136	21.4	26.0	26.0
Ceylon ...	331	340	—	2,767	—	—	8.3	—	—
British Malaya ...	278	299	—	3,478	5,014	—	12.5	16.7	—
Manchukuo ...	208	288	314	3,049	5,744	6,485	14.7	19.9	20.6
Italy ...	141	145	145	6,627	7,340	7,402	47.0	50.7	51.2
Spain ...	48	—	—	2,969	—	—	61.8	—	—
Egypt ...	118	198	111	3,622	6,928	3,711	30.5	35.0	33.6
Madagascar ...	545	486	482	6,777	6,800	6,400	12.4	14.0	13.4
United States ...	387	392	442	8,856	10,002	10,819	22.9	25.5	24.5
British Guiana ...	26	25	—	682	616	—	25.9	24.2	—
Brazil ...	788§	893	—	10,346	12,502	—	14.5§	14.0	—
World total ...	56,190	58,700	59,100	875,700	935,700	929,000	15.6	15.9	15.7

* Unit yields do not in all cases refer to a single crop.
† China's figures not included in totals.
‡ Year 1931-2.
§ Average for two years.
Source: "International Year-Book of Agricultural Statistics."

this trade represented the internal trade of India, but since then it has figured among the exports of Burma and the imports of India.

Rice accounts for 40 per cent. of the total value of Burma's exports, but this figure, though it normally exceeds the value of any other item of the country's export trade, does not adequately reflect the supreme importance of the rice trade in the economic life of Burma. The great bulk of the population of the country is either directly employed in the cultivation, milling, transport, and shipping of rice, or engaged in occupations which derive their prosperity from the rice industry. On the export price of rice depends the welfare of the majority of the population and the state of the rice trade furnishes a fairly reliable barometer of the general prosperity of the country.

The Burman's ability to purchase textile goods from Lancashire hinges on the price he gets for his paddy.

The rice trade is no less important to Siam and Indo-China. With them the relative value of rice exports amounts respectively to over 52 per cent. and 43 per cent. Korea and Formosa, the other chief rice exporters send their exportable surplus to Japan.

Leading purchasers of rice include Japan, British India, and China, and three countries that depend for their prosperity on the plantation industry—namely, Ceylon, British Malaya, and the Netherlands East Indies. All these importers are also growers of rice, and when they have a bumper crop they reduce their import requirements sharply. If, due to drought, floods, or insect pests, their production is below normal, they import larger tonnages from abroad.

MEETING OF THE AGRICULTURAL ADVISORY COMMITTEE.

9th November, 1938.

In addition to routine business, the Agricultural Advisory Committee, at a meeting held at Kuala Lumpur on 9th November 1938, discussed a number of subjects of considerable importance. The following notes, drawn from the Minutes of the Meeting, deal only with the more important subjects.

Grading of Small Holders' Rubber.

In the absence of Mr. Page, Director, Rubber Research Institute of Malaya, Mr. R. Boyd, Director, Co-operative Department, at the request of the Chairman, reported on the present position.

He stated that experiments in grading rubber in the field have not met with any great success. The village dealers are not prepared to accept this grading since they not sell rubber on a basis of grades. Efforts have been made to induce groups of producers to combine in selling direct to large dealers. One group consignment of rubber has been sold according to grades. The net price obtained, after deducting cost of transport, was $1.94 per picul higher than the quotations in the village at the time of sale. It is hoped to popularize this method of sale.

Proposals for Supply of Rubber Budwood to Small-Holders.

The Chief Field Officer stated that as long ago as 1930 budded rubber was cultivated on Agricultural Stations throughout the country for the purpose of demonstration and instruction in budding. The matter is now receiving the close attention of the Rubber Research Institute and this Department and it has been decided to obtain supplies of budwood of approved cloves from the Rubber Research Institute and lay down multiplication nurseries at Agricultural Stations for the purpose of distributing budwood to small holders by the year 1940. Permission has been obtained from the Controller of Rubber to plant up 25 acres of nurseries and Agricultural Officers have applied for proportional quotas for each State and Settlement. No budded stumps have yet been distributed but nurseries are in the course of preparation in all States and Settlements.

The charges to small-holders for budwood will be such as just to meet cost of production.

The Committee agreed on the desirability of popularizing budded rubber amongst small-holders and approved the steps taken in this matter.

Experiments on Tea Manufacture at Serdang.

The Chairman reported that experiments in the manufacture of China tea are in progress at the Central Experiment Station, Serdang. The results already obtained are encouraging from the point of view of manufacture, but not on the financial side. Shopkeepers are keen to purchase this tea at 30 cents per kati for

retail at 45 cents, but the present cost of production hardly makes the price of 30 cents profitable. The Chairman added that there is no hope of ever producing high grade green teas in Malaya to meet the limited demand from well-to-do Chinese.

The meeting agreed that it is very important to continue these experiments in order to increase the proportion of locally produced tea consumed in Malaya.

High Grade Planting Material for Propagation of Derris.

The Chairman reported that two years ago derris clonal work was commenced at Serdang with the types known as Changi Nos. 1, 2 and 3. Changi No. 3 has been found to be the best grower and to have the highest toxic content. A total of 26 acres of mixed clones of Changi No. 3 is now being planted at Serdang.

Major Georgi of this Department visited the Department of Agriculture and various commercial firms in the United States of America in April last, and discussed the question of derris marketing.

The market for derris has dropped recently on account of the large quantities of cubé (lonchocarpus) which reaches the American market. Cubé root has been grown here experimentally, but proved very unsatisfactory. The Department of Agriculture, Washington, has promised to supply high grade planting material of cubé in exchange for planting material of derris.

A Committee, with Dr. Tempany as Chairman, has been formed in London to deal with vegetable insecticides. It is hoped that it will be possible to arrange for investigations by this Committee of alleged adulteration of derris with cubé in the United Kingdom.

Plant Importation Rules — Importation by Air.

The Chairman reported that in accordance with an amendment to the Plant Importation Rules, 1936, published as Gazette Notification No. 2877 in the Straits Settlements Gazette of 7th October, 1938, permits may be granted to import the following fresh fruit: nectarines, peaches, pears, strawberries, plums, raspberries, red and black currants and gooseberries, by air from Australia into Singapore, provided that the consignment is accompanied in each case by a certificate of freedom from pests and disease signed by a duly authorised member of the Department of Agriculture of the country of origin. Such material will be examined by the Agricultural Officer, Singapore, and the Department has power to withdraw such permits at any time.

Departmental.

FROM THE DISTRICTS.

November, 1938.

Compiled by the Chief Field Officer from Monthly Reports of Agricultural Officers.

The Weather.

In Kedah and Perlis heavy falls of rain occurred in November resulting in local flooding in the former State and more extensive inundations in the latter. Nevertheless, the total rainfall in Kedah was below average.

In the West Coast areas rain fell plentifully at the end of October but thereafter conditions became warmer and drier, and the average for the month under review is low. Lack of rain has caused damage to crops in some parts of the country. In South Perak storms caused minor localized floods, but failed to bring the rainfall for the month up to normal. In Johore and Singapore also the rainfall was below average.

Pahang has at last been experiencing some good falls of rain. Rivers have been in spate but no serious flooding occurred. Latterly conditions have been drier.

In the coastal areas of Kelantan rainfall has been heavy and much above average. In Kota Bharu a total rainfall of 34.62 inches was recorded for November, and at Bachok 52.76 inches. In the latter district 43.62 inches of rain fell between the 16th and 21st of that month and much flooding resulted. In the inland districts conditions approximated to normal.

Crop Reports.

Rubber.—Prices of good quality smoked sheet varied between $33 and $37 per picul but declined towards the end of the month. The high price obtained for coupons, the effect of the fasting month in the case of Malay owners, and padi cultivation in some districts resulted in a decline in small-holding production.

An increased interest in planting up new land is now being taken and small holders are reported to be buying planting rights. In Pahang applicants for land are stated to be anxious to plant budded rubber. In all States budwood propagating nurseries have been established and every effort will be made to encourage owners to bud rubber on the areas to be planted.

Malay small-holders at Beranang and Ulu Langat in Selangor have decided to form co-operative groups for the preparation and marketing of their rubber. A previously formed group at Bandar recently sold their third consignment in Klang, at an average price of $37.03 per picul, which compares with the local dealers' price of $35.50.

Padi.—The west coast padi areas continue to look very promising. In Pahang and Kelantan, however, weather conditions throughout the season have not been so favourable. In Negri Sembilan the recent spell of dry weather is said to have caused serious damage to fields which are entirely dependent on rainfall; in many parts of this State planting was carried out late owing to unfavourable conditions. In southern Selangor most of the padi is now ripe, and much has been harvested.

This season's crop has so far been reasonably free from serious attacks of disease. Rat damage also has been slight to date.

Arecanuts.—In Johore, where arecanuts constitute an important minor crop, harvesting is now in full swing. When weather conditions have not been suitable for sun-drying, copra kilns have lately been successfully utilized for curing.

Cloves.—It appears that there will be a poor clove crop in Penang this season. Picking is now under way. Rates of 4 to 5 cents per kati are paid for this work. The price of dried cloves remains steady at $45 per picul.

Livestock.

Pigs.—The market price of pigs has at last improved from the uneconomic level at which it has been for many months. Prices in Selangor have risen from $12 to $18 per picul. Unfortunately, many of the Chinese rearers, having for so long received no profit from their pigs, have already disposed of their breeding stock.

Poultry.—There have been reports of epidemics among poultry from several parts of the country. These outbreaks often occur when the weather is cold and wet. Such weather also causes heavy mortality among chickens due to chills and colds.

Alienation of Land in Kedah for Rubber Planting. A Correction.

In these District notes last month, a statement was made to the effect that the Kedah Government had decided that no new alienation of land should be made for the planting of rubber. The Kedah Government points out that this statement is incorrect. The Government made an announcement in the Penang newspapers on August 15th 1938 that land would be alienated of rubber, and this has not been withdrawn.

DEPARTMENTAL NOTES

Tamil Allotments on Estates.

The article published in this Journal last month, on The Settlement of Tamil Labourers on the Land, has attracted considerable attention and has been the subject of favourable comment in the local press.

Managers of estates and others who desire to encourage market gardening amongst their employees are reminded that officers of this Department are in a position to advise and assist in the development of such schemes. The Department has also published a circular entitled "The Cultivation of Allotments by Tamil Labourers" which is available from this office, price 10 cents per copy post free. A Tamil translation of the circular has been published, copies of which will be sent free of charge on application.

With the object of offering further encouragement to Tamil cultivators, *The Tamil Agricultural Journal,* the official organ in Tamil of the Department of Agriculture, will in future consist of short articles of interest to cultivators, written in simple language, so that it may be of use to those of limited education. Articles of a more technical nature, suitable for educated Tamils, will in future be published as Tamil Circulars.

The decision to effect this change in the Tamil publication has been taken as a result of representations made to the Department, and of a close examination of the problem of how this journal may best serve the nationality for whom it is written.

Advisory Committee, Sultan Idris Training College.

The Principal, School of Agriculture, Malaya, has been appointed an *ex officio* member of the Advisory Committee for the Sultan Idris Training College for Teachers, Tanjong Malim.

Appointment.

Mr. D. G. Jones, B.A., Dip. Agr. Sci. (Camb.) has been appointed to be an Agricultural Officer, Malayan Agricultural Service, with effect from the 7th October, 1938.

Mr. Jones arrived on 3rd November, 1938, and has been temporarily attached to the School of Agriculture, Malaya, as acting Vice-Principal.

Leave.

Major C. D. V. Georgi, O.B.E., returned from leave on 1st December, 1938.

FERTILIZER PRICES, NOVEMBER, 1938.

The following are the prices at the end of November, 1938, of some of the more important fertilizers.

Product.	Analysis				Price per ton $
	Nitrogen (N)	Phosphoric Acid (P_2O_5)		Potash (K_2O)	
		Soluble	Insoluble		
Sulphate of Ammonia ...	20.6	—	—	—	72.75
Calcium Cyanamide ...	20.6	—	—	—	80.00
Muriate of Potash ...	—	—	—	50	112.00
Sulphate of Potash ...	—	—	—	48	112.00
Superphosphate (concentrated) ...	—	39 - 40	—	—	105.00
Superphosphate ...	—	16 - 18	—	—	60.00
Basic Slag ...	—	16	—	—	48.00
Rock Phosphate (Christmas Island) ...	—	11*	38‡	—	33.50
Rock Phosphate (very finely ground Gafsa) ...	—	11*	26 - 28‡	—	40.00
Lime ...	—	—	—	—	20.00

* Citric soluble. ‡ Total

Quotations are *ex* warehouse, Port Swettenham, Klang, Singapore and Penang, with the exception of muriate of potash which is *ex* warehouse, Port Swettenham, Klang and Singapore.

The above quotations for concentrated superphosphate, superphosphate and Christmas Island phosphate are *ex* warehouse Penang, Port Swettenham and Klang. The Singapore quotations for these three fertilizers are $95, $50 and $31.50 per ton respectively.

PLANTATION CROPS.

The Imperial Economic Committee has added a volume under the above title to its very useful series of publications on commodities. This review presents in a convenient form, summaries of production and international trade of sugar, tea, coffee, cocoa, spices, tobacco and rubber, with special reference to the part played by the countries of the British Commonwealth and Nations. The publication may be obtained post free for 2s. 9d., from H.M. Stationery Office, Kingsway, London, W.C. 2.

Statistical.

MARKET PRICES.

November, 1938.

Major Crops.

Rubber.—The Singapore price for No. 1. X. Rubber Smoked Sheet varied between 26½ and 29⅛ cents per lb., the average price for November being 27.96 cents per lb., as compared with 28.70 cents in October. The highest and lowest London quotations were 8⅜d. and 7⅞d. per lb., and New York 17 1/16 cents (gold) and 15 7/16 cents. Average prices per lb. in London and New York respectively were 8.15d. and 16.28 cents, as compared with 8.36d. and 16.83 cents gold respectively in October.

Prices paid for small-holders' rubber at three centres during November are shown in Table I.

Table I.

Weekly Prices Paid by Local Dealers for Small-Holders' Rubber, November, 1938.

(Dollars per picul of 133 1/3 lbs.)

Grades	Kuala Pilah, Negri Sembilan		Kuala Kangsar, Perak			Batu Pahat, Johore.				
	3	10	16	23	30	2	9	16	23	30
Smoked Sheet ...	—	36.40	34.00	32.00	33.95	—	—	—	—	32.53
Unsmoked Sheet ...	34.00	—	—	—	—	31.94	32.30	32.50	32.24	
Scrap ...	No purchases									

Transport by F.M.S.R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.
Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.
Transport from Kuala Kangsar to Prai by railway $6.20 per ton.
Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).
At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.
At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.
No purchases of rubber at Kuala Kangsar on 2nd and 9th, and at Kuala Pilah on 17th and 24th November.

Palm Oil.—November prices of Malayan palm oil and kernels showed a slight upward tendency. The average of weekly quotations per ton in October were:—palm oil £13, kernels £8.4.1. Prices in November are shewn in Table II.

Table II.

Prices of Palm Oil and Palm Kernels.

Date 1938.	Palm Oil in Bulk, c.i.f. landed weight Liverpool/ Halifax. per ton	Palm Kernels, c.i.f. landed weight London/ Continent per ton
November 11	£ 13. 0. 0 Liverpool	£ 8. 0. 0 Continent
,, 18	13. 5. 0 Canada	8. 0. 0 Rotterdam
,, 25	13. 7. 6 ,,	8. 10. 0 ,,
Average	£ 13. 4. 2	£ 8. 3. 4

Copra.—As anticipated in the last report, prices of copra dropped still lower than those ruling in October. The average price for the sun-dried grade was $3.06 per picul in November as compared with $3.12 in October. The Mixed grade averaged $2.73 per picul, as compared with $2.78 in October. Prices at the end of November showed an appreciable upward tendency.

Copra cake was quoted throughout the month at $2.05 per picul.

Rice.—The average Singapore wholesale prices of rice per picul in October were as follows:—Siam No. 2 ordinary $4.47, Rangoon No. 1 $3.70, Saigon $4.07, as compared with $4.39, $4.00 and $3.97 respectively in October 1937, and $4.46 $3.85, and $4.10 respectively in September 1938.

The average retail prices in cents per gantang were in Singapore 29, Penang 34, Malacca 30.

The average declared value per picul of imports during October was $4.06 as compared with $3.98 in September and $4.09 in October 1937.

Padi.—In most producing districts, prices tended to be higher than in October: in Kedah, however, the price per 100 gantangs was $7 to $8.20 (as compared with $8.25 to $9 in October), Penang $9, Perak north $11 to $12, Malacca $10 to $11, Kelantan $9.70, Selangor $8.50 to $10.50, Negri Sembilan $7 to $10, Pahang $10 to $14, Brunei $10 to $12, Labuan $12 to $16.

The Government Rice Mill in Krian paid $2.30 per picul, millers in Kedah $1.85 to $2.20, and the Government Rice Mill, Temerloh, Pahang, $2 to $2.10 per picul.

Pineapples.—The market for canned pineapple is stated to be featureless. Singapore prices per case were as follows:—G.A.Q., Spiral $2.95, Round Cut $3.80, Cube $3.00; Golden, $3.20, $4.00 and $3.25 respectively.

The Singapore price of fresh fruit was higher at $1.80 to $1.90 per 100 fruits. In South Johore the prices were, per 100 fruits, 1st quality $1.10 to $1.00, 2nd quality 90 to 70 cents, 3rd quality 75 to 40 cents. In Selangor the price was 70 to 60 cents per 100 large fruits delivered at factory in Klang.

Beverages.

Tea.—Three consignments of lowland tea comprising 219 packages were sold on the London market during November at an average price of 1s. 0d. per lb., and two consignments (186 packages) of upland tea which sold at an average price of 1s. 1. 88d., per lb.

According to *The Tea Brokers' Association of London Reports* for November the average London price per lb. realized during the month for tea from other countries was as follows:—Ceylon 1s. 2. 47d., Java 1s. 0. 88d., Indian Northern 1s. 1. 46d., Indian Southern 1s. 1. 14d., Sumatra 11. 14d.

Coffee.—Coffee prices showed an upward tendency in October. In Singapore, Sourabaya averaged $11.12 to $10.25, and Palembang $12.19 to $11.62—these are averages of highest and lowest quotations.

Liberian coffee was quoted throughout the month at $14.50 per picul and Robusta at $6.50 per picul. Excelsa rose from $9.50 to $10.50 per picul, the average quotation being $9.70 per picul.

Spices.

Arecanuts.—The average of highest and lowest market prices per picul in Singapore during November were as follows:—Splits $6.65 to $4.87, Red Whole $6.69 to $5.12, Sliced $10.75 to $7.50, as compared with $8.39 to $5.00, $6.63 to $4.50, and $11.52 to $8.37 in October. The price within these ranges depends on quality.

The average of Singapore Chamber of Commerce quotations per picul were:—Best $7.81, Medium $7.44, Mixed $6.56, as compared with $8.19, $7.75 and $6.75 per picul in October.

Pepper.—Singapore Black was quoted throughout November at $8.12½ per picul, Singapore White dropped 25 cents to $12.00 per picul, the average price for the month being $12.19. Muntok White also declined 25 cents to $12.25 per picul, the average price being $12.44 per picul. Average prices per picul in October were $8.03, $12.19 and $12.70 respectively.

Nutmegs.—Both 110's and 80's were quoted in Singapore throughout November at $28.00 per picul. In Penang dried nutmegs were $20 per picul.

Mace.—The Singapore price of Siouw was quoted nominally at $80 per picul; Amboina was $60 per picul throughout the month. In Penang, the price of mace was $85 per picul.

Cloves.—The nominal price in Singapore for both Zanzibar and Amboina cloves was $40 per picul. The Penang price was steady at $45 per picul.

Cardamoms.—The price of green cardamoms as quoted in *The Ceylon Chamber of Commerce Weekly Report* for 28th November, 1938, was from Rs.1.00 to Rs. 1.10 per lb.

Miscellaneous.

Derris.—The downward tendency of prices reported last month still prevails in Singapore. Average prices in November were:—for root sold on basis of ether extract $10 to $11 per picul; for root sold on basis of rotenone content $17.50 to $19 per picul. Growers are hesitant to dispose of their crop at these levels, but exporters state that the demand in consuming countries does not justify better prices at present.

Our New York correspondent reports on November 7th that the New York price of derris has declined further, 5 per cent. elliptica root ruling at about 5½d. c.i.f. New York, and 17 per cent. malaccensis at 4½d. Offerings of high-bearing derris root from Java are appearing from numerous quarters, but ideas of price appear to be somewhat higher than equivalent value warrant.

There is now only a 4 cent spread between the prices at which derris and cube powders are offered to agricultural buyers, against a spread of 10 to 11 cents a year ago. It is believed that purchases of derris root for the coming season are considerably in excess of last year.

Gambier.—Singapore quoted Block gambier at $7 per picul (nominal) and Cube No. 1 at $15 per picul.

Tapioca.—Prices in Singapore of all grades of tapioca remained unaltered during the month: Flake Fair $4.10, Seed Pearl $3.90 and Pearl Medium $4.50 per picul.

Sago.—In Singapore, Pearl sago dropped 10 cents to average $3.77, and Flour Sarawak Fair dropped 7½ cents to average $2.18 per picul. Average prices in October were $3.18 and $2.16 per picul respectively.

Tobacco.—Prices continue to vary in different parts of the country. In Kelantan the price remains high, 1st grade being per picul $120 to $160, 2nd grade $80 to $126, 3rd grade $70 to $112. In Kedah the three grades were $33 to $35 $21 to $26.50, $14 to $16; in Penang $35, $24 and $15. Prices dropped in Perak South, 1st grade $21 to $33, 2nd $17 to $24, 3rd $10 to $20. In Malacca the price was $23 to $25, and in Johore there continued to be a wide range of prices depending on local demand, quality and class of leaf, Javanese tobacco commanding a premium over Chinese leaf.

The above prices are based on London and Singapore daily quotations for rubber, on the Singapore daily prices for copra, on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports and certain coffee prices are kindly supplied by Messrs Guthrie & Co. Ltd., Kuala Lumpur, the Singapore prices of imported coffee and arecanuts by Lianqui Trading Company of Singapore, and Singapore derris prices by Messrs. Hooglandt & Co., Singapore.

1 Picul = 133 1/3 lbs. The Dollar is fixed at two shillings and four pence.

Note:— The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57 Trafalgar Square, London, W.C. 2.

GENERAL RICE SUMMARY*

October, 1938.

Malaya.—The imports of foreign rice during October were 78,525 tons,† exports were 18,082 tons, net imports therefore were 60,443 tons, as compared with 50,015 tons in September 1938, and 37,261 tons in October 1937.¶

Gross imports for the first 10 months of 1938 were 691,986 tons, exports were 163,649 tons, net imports being 528,337 tons.

Of the October 1938 imports, 47 per cent. were consigned to Singapore, 16 per cent. to Penang, 8 per cent. to Malacca, 21 per cent. to the Federated Malay States and 8 per cent. to the Unfederated Malay States. The foreign imports by countries of origin were as follows (in tons, percentages in brackets):— Siam 47,500 (60.5), Burma 26.793 (31.1), French Indo-China 3,154 (4.0), elsewhere 1,078 (1.4).

Of exports during October, 80 per cent. were consigned to the Netherlands Indies and 20 per cent. to other countries. The various kinds of rice exported were as follows (in tons, percentages in brackets):— Siam 13,916 (77.0), Burma 3,546 (19.6), French Indo-China 516 (2.8), Parboiled 50 (0.3), Malayan 54 (0.3).

Net imports of rice during October by countries of origin were, in tons:— Siam 33,584, Burma 23,247, French Indo-China 2,638, elsewhere 974.

India.—Foreign exports January to September were 205,000 tons, as compared with 641,000 in 1937, a decrease of 68.0 per cent. Of these 2.4 (4.1) per cent. were to the United Kingdom, 3.9 (5.9) per cent. to the Continent of Europe, 39.0 (28.4) per cent. to Ceylon, 4.9 (22.0) per cent. to the Straits Settlements and the Far East, and 49.8 (39.6) per cent. to other countries. The figures in brackets are for the corresponding period of 1937.

According to the first rice forecast of All-India for the season 1938-39, the area under rice is estimated at 65,812,000 acres, an increase of 1.4 per cent., as compared with 64,873,000 (revised) acres. The crop is reported to have been affected by heavy rains and floods and its condition to be fair on the whole.

Burma.—Foreign exports 1st January to 26th October 1938 were 2,747,727 tons, as compared with 2,834,880 tons in 1937, a decrease of 3.1 per cent. Of 1938 exports, 40.3 (44.6) per cent. were to India, 11.3 (9.0) per cent. to the United Kingdom, 9.3 (10.6) per cent. to the Continent of Europe, 12.1 (11.5) per cent. to Ceylon, 14.7 (14.1) per cent. to the Straits Settlements and the Far East, and 12.3 (10.2) per cent. to other countries. The figures in brackets are for the corresponding period of 1937.

Average October prices in rupees per 100 baskets of 75 lbs. each at Rangoon were:—Big Mills Specials 220, Small Mills Specials 232.

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* Abridged from the Rice Summary for October, 1938, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† Ton = long ton (2,240 lbs.)

¶ It is to be understood throughout the Summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1937.

The first forecast for the 1938-39 rice crop of Burma estimates the area likely to mature at 12,677,600 acres, an increase of 0.7 per cent. as compared with the final figures for last year.

The monsoon has been generally very favourable in Lower Burma and the wet zone of Upper Burma, and, except for a rather prolonged break in the middle rains, in the dry zone also. There has been an almost complete absence of serious flooding. The favourable season is reflected in the great decrease in the area estimated to be destroyed as compared with last year and the corresponding increase in the estimated matured area. Standing crops are for the most part in good condition and if normal rainfall is received during the next few weeks an excellent crop may be expected.

Siam.—Exports of rice and rice products from Bangkok during August were 117,877 tons, making a total of 1,049,082 tons for the first 8 months of 1938, as compared with 640,032 tons in 1937.

Based on telegraphic reports from 60 Provinces, the rice crop conditions at the end of September were as follows:— Cultivated Area: The total area sown is 6,476,041 acres, as compared with 6,587,795 acres at the same time last year, a decrease of 111,754 acres.

The damaged area was stated to be 357,171 acres, as compared with 398,994 acres at the same time last year. As a whole, the present crop is said to be generally satisfactory with 33 Provinces doing well, 26 doing fairly well and 1 Province not doing well.

Japan.— The first estimate of the 1938 rice crop of Japan is reported at 9,082,478 tons, a decrease of 214,537 tons or 2.3 per cent. as compared with last year's actual crop.

The area under rice in Japan during 1938 amounted to 7,877,437 acres, an increase of 3,112 acres or 0.04 per cent. over 1937.

Plantation acreages and actual yields for the previous five years are:—

		Plantation Acreage (In acres)	Real Crop (In tons)
1933	...	7,769,975	9,931,266
1934	...	7,769,459	7,267,506
1935	...	7,845,278	8,053,892
1936	...	7,850,334	9,440,560
1937	...	7,874,325	9,297,015

French Indo-China.—Entries of padi into Cholon during the first 10 months of 1938 amounted to 909,937 tons, as compared with 1,296,488 tons in 1937, a decrease of 29.8 per cent. Exports during the same period were 959,759 tons, as compared with 1,326,493 tons in 1937, a decrease of 27.6 per cent.

Saigon prices declined during October—padi from $2.42 per picul to $2.34 per picul, while rice fell from $3.61 per cent. to $3.54, but recovered to $3.57 per picul.

The Netherlands Indies.—The area harvested in Java and Madoera during January to June 1938 amounted to 7,197,580 acres, a decrease of 1.0 per cent. as compared with 7,266,740 acres in 1937.

Imports into Java and Madoera January to June 1938 were 21,886 tons, as compared with 1,488 tons in 1937, an increase of 1,370.8 per cent. During the same period imports into the Outer Provinces were 144,379 tons, as compared with 61,809 tons in 1937, an increase of 133.6 per cent.

Ceylon.—Imports of rice during the first 10 months of 1938 were 459,956 tons as compared with 443,959 tons in 1937, an increase of 3.6 per cent.

Of these imports, 18.3 (17.2) per cent. were from British India, 69.6 (70.0) per cent. from Burma, 0.2 (0.1) per cent. from the Straits Settlements and 11.9 (12.7) per cent. from other countries. The figures in brackets are for the corresponding period of 1937.

Europe and America.—Shipments of rice from the East to Europe from the 1st January to 7th October were 1,034,665 tons, as compared with 948,726 tons in 1937, an increase of 9.1 per cent. Of these shipments, 40.3 (43.9) per cent. were from Burma, 48.8 (49.8) per cent. from Saigon, 9.6 (4.5) per cent. from Siam, and 1.3 (1.8) per cent. from Bengal. The figures in brackets are for the corresponding period in 1937.

Shipments to the Levant from 1st January to 20th September were 31,071 tons, as compared with 14,387 tons in 1937, an increase of 116.0 per cent.

Shipments for Cuba, West Indies and America from 1st January to 19th September were 162,279 tons, as compared with 209,184 tons in 1937, a decrease of 22.4 per cent.

MALAYAN AGRICULTURAL EXPORTS, SEPTEMBER, 1938.

PRODUCT.	Net Exports in Tons				
	Year 1937	Jan./Sept. 1937	Jan./Sept. 1938	September 1937	September 1938
Arecanuts ...	30,084	23,241	27,926	2,747	1,543
Coconuts fresh ...	95,223†	69,487†	76,907†	10,282†	8,398†
Coconut oil ...	39,762	29,521	33,574	4,114	4,759
Copra ...	75,592	50,171	37,879	9,651	9,611
Gambier, all kinds ...	1,955	1,536	1,208	232	104
Copra cake ...	15,026§	11,010§	5,004	1,503	376
Palm kernels ...	7,312	4,641	6,292	537	880
Palm oil ...	42,787	31,079	41,999	2,911	6,353
Pineapples, canned ...	80,502	68,769	59,987	4,180	4,949
Rubber ...	503,127¶	366,892¶	283,324¶	46,047¶	25,831¶
Sago,—flour ...	15,478	10,397	3,395	1,883	1,044
,, —pearl ...	3,759	2,563	3,181	452	420
,, —raw ...	8,256*	5,951*	4,020*	662*	463*
Tapioca,—flake ...	1,058	838	687	121	56
,, —flour ...	2,393*	1,678*	2,390*	365*	148*
,, —pearl ...	18,786	12,851	13,441	2,807	1,598
Tuba root ...	573	480	407	48	71

† hundreds in number. * net imports. ¶ production. § gross exports.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS

(In long tons, as declared by Estates)

Month 1938	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January	2,241.7	1,309.2	383.7	232.0
February	2,040.4	1,457.1	370.4	261.0
March	2,359.6	1,843.1	446.8	344.0
April	1,963.7	1,122.6	353.6	218.0
May	1,491.7	1,480.7	274.8	258.0
June	1,773.5	1,781.2	315.9	247.0
July	2,546.5	2,134.2	450.8	311.0
August	3,587.4	2,798.1	587.8	437.0
September	3,415.9	1,779.2	591.4	289.0
October	2,817.9	2,056.3	483.0	304.0
Total ...	24,238.3	17,761.7	4,258.2	2,901.0
Total January to October, 1937	23,011.1	14,833.4	4,116.5	2,392.5
Total for the year 1937 ...	27,733.5	17,932.8	5,094.7	2,811.4

Stocks on estates as at 31st October, 1938, were palm oil 2,578 tons, palm kernels 1,017 tons.

MALAYAN RUBBER STATISTICS

Acreages of Tappable Rubber actually Tapped and not Tapped on Estates of 100 Acres and over, for the Month ending 31st October, 1938.

State or Territory	Estimated Acreages of Tappable Rubber	Actual area tapped during the month Acreage	Percentage of (3) to (2)	Acreages of tappable rubber not tapped: Estates which have entirely ceased tapping — Acreage	Percentage of (5) to (2)	On estates which have partly ceased tapping: Otherwise than under rotational systems — Acreage	Percentage of (7) to (2)	Under rotational systems — Acreage	Percentage of (9) to (2)	Area of Tappable Rubber never been tapped — Acreage	Percentage of (11) to (2)	Total area not tapped (5) + (7) + (9)	Percentage of (13) to (2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
S. S.—													
Province Wellesley ...	43,334	19,069	44.0	932	2.1	14,929	34.5	8,404	19.4	443	1.0	24,265	56.0
Malacca ...	121,481	56,823	46.8	2,936	2.4	31,706	26.1	30,016	24.7	1,693	1.4	64,658	53.2
Penang ...	2,478	1,200	48.4	nil	nil	1,218	49.2	60	2.4	9	0.4	1,278	51.6
Singapore ...	32,133	14,833	46.2	5,030	15.6	7,140	22.2	5,130	16.0	83	0.3	17,300	53.8
Total S.S. ...	199,426	91,925	46.1	8,898	4.4	54,993	27.6	43,610	21.9	2,228	1.1	107,501	53.9
F. M. S.—													
Perak ...	285,783	153,832	53.8	9,243	3.3	69,495	24.3	53,213	18.6	6,990	2.4	131,951	46.2
Selangor ...	322,747	193,440	59.9	6,909	2.2	58,830	18.2	63,568	19.7	6,416	2.0	129,307	40.1
Negri Sembilan ...	254,734	134,132	52.7	10,347	4.0	60,824	23.9	49,431	19.4	7,176	2.8	120,602	47.3
Pahang ...	86,498	42,612	49.3	7,067	8.1	25,847	29.9	10,972	12.7	6,357	7.3	43,886	50.7
Total F.M.S. ...	949,762	524,016	55.2	33,566	3.5	214,996	22.6	177,184	18.7	26,939	2.8	425,746	44.8
U. M. S.—													
Johore ...	476,342	265,290	55.7	18,868	4.0	123,653	25.9	68,531	14.4	33,015	6.9	211,052	44.3
Kedah ...	199,207	112,941	56.7	9,160	4.6	35,880	18.0	41,226	20.7	5,286	2.7	86,266	43.3
Kelantan ...	31,406	18,576	59.1	253	0.8	7,202	23.0	5,375	17.1	2,266	7.2	12,830	40.9
Trengganu (*b*) ...	4,817	3,159	65.6	nil	nil	97	2.0	1,561	32.4	74	1.5	1,658	34.4
Perlis (*c*) ...	1,371	621	45.3	262	19.1	354	25.8	134	9.8	75	5.5	750	54.7
Brunei ...	5,746	2,440	42.5	nil	nil	2,646	46.0	660	11.5	247	4.3	3,306	57.5
Total U.M.S. ...	718,889	403,027	56.1	28,543	4.0	169,832	23.6	117,487	16.3	40,963	5.7	315,862	43.9
Total Malaya ...	1,868,077	1,018,968	54.5	71,007	3.8	439,821	23.6	338,281	18.1	70,130	3.8	849,109	45.5

Notes:—(*a*) The acreage shown in column (11) is included in columns (5) and (7).
(*b*) Registered companies only
(c) Figures for the quarter ending 30th September, 1938.

MALAYAN RUBBER STATISTICS Table I.

ACREAGE, STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF OCTOBER, 1938 IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		January to Oct. 1938		during the month		January to Oct. 1938						
	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to Oct. 1938	during the month	Jan. to Oct. 1938	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to Oct. 1938
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MALAY STATES :—																				
Federated Malay States ...	...	6,384	21,043	9,816	109,133	5,647	49,888	Nil	Nil	Nil	Nil	9,734	3,365	*118,770 †116,377	35,855	...	8,059	21,716	16	161
Johore ...	...	3,074	8,748	4,279	49,435	1,906	28,544	Nil	48	Nil	299	1,729	5,687	28,219	49,054	...	2,136	8,503	...	...
Kedah ...	...	217	4,997	2,257	26,645	750	8,281	Nil	Nil	Nil	Nil	1,369	1,849	16,392	17,660	...	260	4,743	...	...
Perlis ...	...	19	30	9	121	21	208	Nil	Nil	Nil	Nil	Nil	34	Nil	309	...	20	25	...	...
Kelantan ...	...	739	653	314	3,564	605	5,980	Nil	Nil	Nil	Nil	263	840	2,761	6,661	...	550	658	...	...
Trengganu ...	...	55	50	333	2,540	166	1,274	Nil	Nil	Nil	Nil	Nil	499	5	3,809	...	55	50	...	...
Brunei ...	...	Nil	76	40	449	75	663	...	...	...	...	...	93	...	1,089	...	14	48	...	...
Total Malay States	...	10,488	35,597	17,048	191,887	9,170	94,838	Nil	48	Nil	299	13,095	12,367	166,147	114,437	...	11,094	35,779	16	161
S. SETTLEMENTS :—																				
Malacca ...	...	1,986	2,066	915	10,694	190	5,013	Nil		Nil		1,839		23,029		...	2,189	1,993	...	...
Province Wellesley	...	2,463	884	365	4,007	189	2,048	Nil		Nil		7,463		73,034		...	2,512	836	...	...
Penang ...	1,802	5,087	10	15	175	41	774	3,109	11,424	25,408	116,719		Nil		Nil	1,186	4,929	14	...	...
Singapore ...	3,739	24,770	288	105	1,390	51	481	13,430		112,392		19,897		192,460		5,132	23,663	276	27	250
Labuan ...	...	33	Nil	Nil	Nil	7	113	60		475		Nil		Nil		...	27	Nil	...	...
Total Straits Settlements ...	5,541	34,339	3,248	1,400	16,256	478	8,429	16,599	11,424	138,275	116,719	29,199	Nil	288,523	Nil	6,318	33,320	3,119	27	250
Total Malaya ...	5,541	44,827	38,845	18,448	208,153	9,648	103,267	16,599	11,472	138,275	117,018	42,294	12,367	454,670	114,437	6,318	44,414	38,898	43	411

*Ocean Shipments from Malaya of rubber directly consigned from F.M.S. †Exports of rubber from F.M.S.

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	7,137	22,936	4,701	4,484	1,706	108
WET RUBBER	922	727	228	258	430	152
TOTAL ...	8,059	23,663	4,929	4,742	2,136	260

TABLE III
FOREIGN EXPORTS

PORTS	For month	Jan. to Oct. 1938
29	30	31
Singapore ...	27,933	303,442
Penang ...	11,065	107,358
Port Swettenham.	3,070	41,839
Malacca ...	176	2,031
MALAYA ...	42,294	454,670

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	Jan. to Oct. 1938
32	33	34
Malay States ...	25,437	277,582
Straits Settlements	1,859	23,456
MALAYA ...	27,296	301,038

Notes:—
1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month. + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Columns (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication therefore, is always the most reliable.

METEOROLOGICAL SUMMARY, MALAYA, OCTOBER, 1938.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						hrs.	hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	89.7	71.6	80.7	96	69	81	75	83.3	84.5	9.47	240.5	2.45	18	18	8	7	1	182.60	5.89	49
Bukit Jeram, Selangor ...	89.0	72.1	80.5	93	70	76	74	85.0	86.7	5.46	138.7	1.36	14	12	1	2	—	199.70	6.44	53
Sitiawan, Perak ...	88.3	72.6	80.5	91	68	84	75	83.8	84.6	3.19	81.0	0.87	15	11	3	2	—	178.25	5.75	48
Ipoh Aerodrome, Perak ...	89.8	71.9	80.9	94	68	86	75	83.3	84.1	10.53	267.5	4.42	16	10	9	—	—	185.35	5.98	49
Temerloh, Pahang ...	91.2	72.1	81.7	95	69	86	75	85.4	86.8	7.21	183.1	2.95	14	12	2	7	1	185.20	5.97	49
Kuala Lipis, Pahang ...	89.8	70.8	80.3	95	68	84	74	83.9	85.1	10.95	278.1	3.16	20	17	4	25	2	175.80	5.67	47
Kuala Pahang, Pahang ...	87.3	74.2	80.7	93	71	80	77	84.8	87.3	12.61	320.3	4.74	14	13	5	1	1	226.90	7.32	60
Kallang Aerodrome, S'pore ...	86.2	75.6	80.9	89	72	83	80	83.1	83.8	6.33	160.8	1.48	14	12	3	—	—	182.55	5.89	49
Bayan Lepas Aerodrome Penang ...	86.8	74.1	80.5	90	69	82	78	83.6	84.3	7.12	180.8	0.89	21	21	2	—	—	191.10	6.16	51
Malacca Town, Malacca ...	85.5	73.5	79.5	88	70	82	77	84.0	85.1	12.41	315.2	2.62	17	14	8	1	2	210.45	6.79	56
Kluang, Johore ...	88.7	71.1	79.9	93	69	84	74	82.0	82.6	6.00	152.4	1.39	21	18	6	12	—	175.40	5.66	47
Mersing, Johore ...	87.4	71.9	79.7	92	70	83	76	82.3	82.5	9.30	236.2	2.40	17	14	6	—	1	207.65	6.70	55
Alor Star, Kedah ...	87.3	73.7	80.5	90	70	79	77	84.3	85.1	5.97	151.6	1.70	17	13	1	2	—	199.25	6.43	53
Kota Bahru, Kelantan ...	88.0	73.1	80.5	92	71	79	75	84.2	85.1	8.46	214.9	4.20	18	12	3	—	—	205.15	6.62	55
Kuala Trengganu, Trengganu	87.6	72.5	80.1	92	70	78	74	82.7	85.2	8.77	222.8	2.13	22	19	4	1	—	209.70	6.76	56
Labuan ...	87.3	76.7	82.0	91	72	81	80	85.7	86.6	10.43	264.9	2.50	17	15	2	—	1	198.60	6.41	53
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft.	73.9	62.4	68.1	78	61	68	64	71.3	72.2	18.06	458.7	6.77	23	16	2	12	1	169.20	5.46	45
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	71.5	56.3	63.9	75	50	68	62	70.1	73.7	10.25	260.4	2.39	25	20	—	—	3	131.50	4.24	35
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	71.7	59.0	65.3	76	57	66	61	*	*	11.21	284.5	2.98	22	18	*	*	3	141.75	4.57	38

* Not recorded.

Compiled from Returns supplied by the Meteorological Branch, Malaya.